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CHARLES W. PRICE, President and Treasurer.
A. A. GRAY, General Manager. H. S. TUTHILL, Secretary.
C. W. FORBRICH, Assistant Treasurer.

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EASTERN DEPARTMENT . . . . . 13 Park Row, New York.
E. E. Wood, Manager.
EUROPEAN OFFICE . . . . . 42 Old Broad Street, London, E. C.
Henry W. Hall, Manager.

CHARLES W. PRICE .....Editor-in-Chief
A. A. GRAY .....Managing Editor
MORTON GITHENS LLOYD ..... Technical Editor
HENRY FARRINGTON .....Associate Editor
F. H. BERNHARD .....Associate Editor
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## TELEPHONE MONOPOLY AND THE GOVERNMENT.

Attention is directed to a timely article entitled "Telephones and the Postoffice in England," abstracted from the London (England) *Financial Times*, which appears in another part of this issue. The information compiled by our contemporary, which is unusually well informed on financial matters, apparently shows that state ownership of a telephone monopoly tends to check natural development such as has obtained in this country under the management of quasi public-service corporations.

The reason for this is shown to be the want of invested capital necessary to produce a development which shall keep pace with the natural expansion of telephone service and its ultimate universal adoption by all classes for all purposes of intercommunication to which it is naturally adapted. Under the conditions obtaining in Great Britain, instead of more and more capital being put into the telephone business from year to year, the amount of money invested has fallen off. This was so, not only in the case of the National Telephone Company which is to be taken over by the British Government, but also in the case of the telephone investment of the British Government itself. Later, perhaps, the government will see fit to make proper appropriations for telephone expansion, but unless the government-owned telephone system speedily shows profits which can be utilized for development and betterments, it would seem to be more than likely that the development of the telephone service will be retarded at least for some years to come. Budget makers in England are finding it harder and harder each year to make ends meet, and therefore the outlook for the telephone in England does not appear to be very rosy, to say the least.

That the telephone business is inherently in the nature of a monopoly, few people will deny; that it should be made a monopoly legislatively, however, even when privately owned, is another matter. This point was referred to in a recent address on "The Telephone Business as an Economic Problem," delivered on March 22 last by Justice Morrill N. Packard (of the Juvenile Court of Baltimore, Md.) before the Telephone Society of Baltimore. Justice Packard was comparing the policy of the telephone company in Baltimore with that of a gas corporation which was fighting to retain a legislative monopoly accorded to it by

virtue of a law which required that nobody (other than the gas corporation) shall run a line of gas pipe in certain districts in and around Baltimore. This law, the justice affirmed, was passed so that bonds could be sold on the representation of the company having an absolute monopoly, which latter was not obtained through the confidence of the people, and which the gas company was trying to maintain against the interests of the people. "You must have the confidence of the great American people with whom you are dealing," said Justice Packard. "You have their good will, and that is far better than to have that sort of monopoly than can be thrown over with a turn of the wind. I should rather have, frankly speaking, a monopoly in the telephone business of Baltimore City because of the company's fair treatment to its subscribers, its courteous treatment to the public, its failure to participate in politics, its failure to go to the lobby with counsel; I would rather have that sort of monopoly than I would have the created legislative monopoly without the confidence of the people that can destroy it."

## ELECTROCHEMISTRY.

The recent meeting in Pittsburg of the American Electrochemical Society serves to draw attention again to the enormous strides which are being made by this comparatively new recruit to the electrical industries. Electrochemical processes are to-day assuming an industrial importance which it is hard to realize, and every year sees established some new developments in the application of the electrical current to chemical and metallurgical processes. Many of these applications depend, in their possibilities of commercial success, upon the availability of cheap electrical power. In consequence we see the gravitation of such industries to places like Niagara Falls, where the necessary conditions of power supply are to be found. Many of these industries could never be established at the rates for power which are charged by the ordinary central station. On the other hand, there are many central stations which can afford to make very low rates for a day load, and it would be well for managers to offer inducements for the establishment of such electrochemical plants as do not require operation during the peak hours.

Of course the ideal location for industries requiring cheap power is near a hydroelectric station, but this may sometimes involve long hauls of material. A visitor to the Pittsburg district cannot but be impressed with the great waste of power involved in the old fashioned methods of operation of coke ovens and blast furnaces, and the paper by Professor Crabtree which is abstracted in this issue indicates that power might be utilized from these sources at a cost which would, under conditions otherwise favorable, permit competition with hydroelectric generating stations. Pittsburg has been so busy turning out tonnage that her citizens have given little attention to economies or to the attraction and encouragement of new industries. The meeting of the Electrochemical Society must leave its impress upon the city in calling its attention to these things, and no one who heard the public address of Secretary Richards could fail to be impressed with the growing importance of this group of industries. The Society will do well to invade other communities, both for its own advantage and for their enlightenment, and a convention at some point west of the Ohio River should be held at no very distant time.

## ELECTRICITY IN THE STEEL INDUSTRY.

Over thirty years have passed since Siemens patented his electric furnace for melting iron and steel, and for ten years Héroult has been using the electric method of producing special ferro-alloys. It was but a step from this to the production of alloy-steels and high-grade carbon-steels in the electric furnace, and the smelting of iron ore has also been successfully accomplished and can be operated to advantage under certain conditions of power cost, etc.

The electric-furnace method of making high-grade steel seems destined to drive the expensive crucible process out of the field. Several of these furnaces have been in operation in the United States long enough to demonstrate not only their practicability in operation, but their complete commercial success. At last the Pittsburg field, with its cheap fuel, has also been invaded, and a Héroult furnace has been operated by the Firth-Sterling Company with entire satisfaction.

The cost of this process is but little greater than the open-hearth method, but a grade of steel can be produced equal to the best crucible-steel. In using an arc furnace, any impurities can be burnt out, although with the other forms of furnace, the quality of the product will depend largely upon the quality of the raw material. It is easy, however, to produce alloy-steels of any desired composition, and it is hard to see how the crucible process is to hold its own against the new competitor. In a few years we may well expect to see around Pittsburg, not one but a host of electric furnaces, and in sizes larger than have yet been attempted.

## SOME MORALS FROM GREAT BRITAIN.

Attention has been directed from time to time to the letters from our foreign correspondents. In the Great Britain monthly letter, which appears on other pages of this issue, there are pointed some morals, which, although by no means new, are none the less topical and deserving of the attention of all central-station operators.

Of the two matters to which we will here make reference, the first is the condition of the London United Company. This company is now in a pretty bad way, owing to

the fact that too large dividends were paid in the early years of its existence and not enough allowance made for depreciation and renewals. This matter of depreciation was taken up in one of our editorials last week in connection with a recent paper on the subject by William B. Jackson at a meeting of engineering societies in Chicago. Further reference here then is not necessary except to point out the London company as a "horrible example" and to warn others to profit by its unfortunate experience.

The other matter is the question of economy in central-station operation, as evidenced by the experience of the Liverpool District Lighting Company. This central station is typical of many others. Starting in a very humble way, it has attempted to keep pace with its growing requirements by adding units one by one to its generating equipment. The result is that the station now comprises no less than seven small engine-driven sets, which, as our correspondent aptly puts it, are veritable "steam-eaters." A little aforethought would have avoided much of the waste now going on, by anticipating business for some few years ahead. That is to say, instead of adding a small unit, a much larger and therefore far more economical set could have been installed at a time when expansion became necessary. The existing small units could then have been used as a stand-by, or scrapped or sold, as may have seemed advisable, all the normal load being taken care of by the single new set. Thus the increased economy of operation would probably pay for the extra capital expense involved, and the ultimate economy very largely increased. As it is, the Liverpool concern has after all to scrap its seven small units and install a single large set. The moral is obvious.

## FLOUR-MILL FIRES AND THEIR PREVENTION.

Since the day of the flour mill operated by the old waterwheel the prevention of fires in mill buildings has become a problem of considerable moment. Its importance lies in the fact that as these mills have become more or less isolated from a plentiful water supply, a fire usually results in a total loss. With the more general use of steam power, boilers were installed and engines set up in the mill buildings themselves or in annexes to the mill. Hundreds of mills have sprung up in regions practically isolated from a water supply sufficient in amount for fire-protection purposes. Moreover these buildings are for the most part frame structures and soon become covered with extremely inflammable flour dust. Apparently there is only one way of stopping this loss, and that is by the installation of a safe source of power, and the only power that fills this specification is electricity.

Figures given in a recent issue of the *Quarterly* of the National Fire Protection Association show that one half of the mills in which fires have occurred in the past ten years were total losses. Of these mills over seventy-five per cent were driven by steam plants located at the mill and not quite one per cent by electricity. Unquestionably the greater part of the mills are steam-driven, and the cause of the greater number of fires is given as unknown. It cannot, however, be denied that many of these fires find their origin in the boiler room adjacent to the mill. In nearly all such installations the stack projects through a combustible roof, and hardly ever is the boiler room entirely cut off from the mill proper.

With the installation of motor drive in place of such boiler and engine equipment the number of mill losses would undoubtedly be decreased. The miller would profit, and the load is of such a nature as to be quite desirable from the point of view of the central station.

## INDUSTRIAL PENSIONS.

It is a significant fact that a large electrical firm was one of the first industrial companies to adopt a system of old-age pensions. About four years ago this pension fund was started with $400,000 to which various sums were added later. With accrued interest the total is now $597,500. Under this system all employes who are over sixty and have been with the company for twenty consecutive years are entitled to a pension. Other provisions are made for different ages and terms of service.

Apparently there lies in this system a help if not a remedy for a good many industrial troubles. The employer by offering the pension shows his appreciation of the work already done by workmen who have grown old in his service. The employe by accepting the pension gets a just reward for his long continued labor.

It might be said that four years is hardly a long enough time to give such a system a fair trial, but the present results are extremely favorable.

## UNDERGROUND TELEPHONE TRUNK LINE CONSTRUCTION.

Two short news items in this issue contain interesting announcements relating to impending underground conduit construction for telephone trunk lines. One of these refers to a proposed line from Boston to Washington, in this country, and the other to a line between Leeds and Hull, in England. Such a policy, if eventually carried out universally, will be a great advance toward preventing delays on main lines of intercommunication due to atmospheric and other disturbances.

Already many of the principal cities and towns have taken steps to put all electric wires underground. The capital expense involved in such a change-over is, of course, enormous, but the benefits accruing, not only from a practical but from an aesthetic standpoint, seem to have caused general approval.

**National Electric Light Association Appointments.**

Owing to the sudden death on April 29 last of George F. Porter, master of transportation of the National Electric Light Association, President Frueauff has appointed Charles H. Hodskinson, 70 State Street, Boston, Mass., in his place, and Mr. Hodskinson, who has already been associated in this work, has actively assumed his new duties and is now issuing circulars to the membership as to fares, convention trains, etc. A general open rate of a fare and a half has been granted by various passenger associations.

Dr. W. H. Tolman, director of the Museum of Safety, has sailed this week for Europe, as special commissioner from the association to make a study of the workings and present status of employers' insurance and liability legislation and conditions in Europe, particularly in Germany, England and France. On his return he will make a report to the association which will be issued during the coming summer.

**San Francisco Section of the American Institute of Electrical Engineers.**

A meeting of the local section of the American Institute of Electrical Engineers was held in San Francisco Friday evening, April 29, at which an interesting paper on "The Watt-Hour Meter," was presented by Messrs. Jones and Shepherd of the General Electric Company.

A pleasant feature of the meetings of this section is an informal dinner which usually precedes the meeting.

**Underground Telephone Trunk Lines.**

An event of more than ordinary importance to the telephone-using public in general is the recent application of the American Telephone and Telegraph Company and the Chesapeake & Potomac Telephone Company, of Baltimore, Md., to the Maryland State Good Roads Commission for permission to place conduits under the new road between Baltimore, Md., and Wilmington, Del. Present plans call for the installation of about 100 wires in the conduits which will be placed in the ground below the plane of freezing and arranged so that they may be tapped at any point in the line.

This new development is said on good authority to be the initial step in a gigantic scheme involving the expenditure of $12,000,000, to install an underground telephone trunk system to extend between Boston and Washington, and to include New York, Philadelphia and Baltimore. Later, it is further proposed to extend the underground trunk system to take in all the principal cities in the South and West. Such a scheme, while involving a vast capital outlay, would have the tremendous advantage of making the telephone lines absolutely proof from damage by storms or other superficial weather disturbances.

**Important Telegraph Decision.**

The Western Union Telegraph Company won a victory over a number of Pennsylvania residents when Judge Buffington in the United States Circuit Court of Appeals handed down a decision reversing that of the lower court. During a heavy storm in 1903 fourteen miles of wire were torn down and the company then, to strengthen the wires, erected an extra pole between every two in position before the storm. The residents along the road contested the right of the company to erect the poles.

The lower court sustained this contention and refused to grant the company an injunction restraining the residents from chopping down the poles. The Court of Appeals, however, holds that the company has a right to make these improvements and orders that the decree of the lower court be reversed, the case reinstated and an injunction issue restraining the respondents from tearing down, or in any way interfering with the erection of the poles, so long as the complainant stays within the bounds of the law.

**New York Telephone Capital Increased.**

Certification was made on May 2 to the Secretary of the State of New York by the New York Telephone Company that it had increased its capital stock from $100,000,000 to $125,000,000. Of the existing capitalization there has been issued $85,672,800. Ford Huntington, treasurer of the company, certifies that all the stockholders consented to the increase in the stock and gives the following as the list of all shareholders in the New York company:

U. N. Bethell, John H. Cahill, Benjamin L. Chase, John W. Griggs, Edward J. Hall, James H. Manning, J. F. Maynard, William Nottingham, William D. Sargent, Howard F. Thurber, Theodore N. Vail, Equitable Trust Company of New York, successor by merger to the Bowling Green Trust Company as trustees under an agreement between the Western Union Telegraph Company, and the Bowling Green Trust Company; Henry H. Watson, William H. Woolverton.

**Brooklyn Edison Improvements.**

The Edison Electric Illuminating Company, of Brooklyn, N. Y., is at present making extensive additions and improvements which will aggregate more than one-half million dollars.

The most important of these operations is at the main generating station, at the foot of Gold Street, where a new boiler house of steel construction is being erected for sixteen new boilers, capable of supplying boiler capacity for 20,000 kilowatts of additional operating capacity. The new building will also contain storage capacity for 7,000 tons of coal.

**North Shore Electric Plan.**

North Shore Electric stockholders have authorized an increased in the capital stock from $5,000,000 to $7,000,000 and an issue of $25,000,000 first refunding general mortgage five per cent bonds under a blanket mortgage on the property. Russell, Brewster & Company head the syndicate which takes the bond issue and will offer some of the bonds to the public shortly. No new stock will be sold by the company for some time. Eventually stockholders will get $7,000,000 new stock at par distributed pro rata. The management says the proceeds from sale of the securities will go entirely into expansion and improvements.

**Educating Telephone Subscribers.**

Copenhagen, Denmark, has adopted a unique way of putting a check on the use of bad language over the telephone. A gramophone recording apparatus has been installed at the central telephone exchange, and bad cases of objectionable language can be recorded by it for use in fixing responsibility on the offenders.

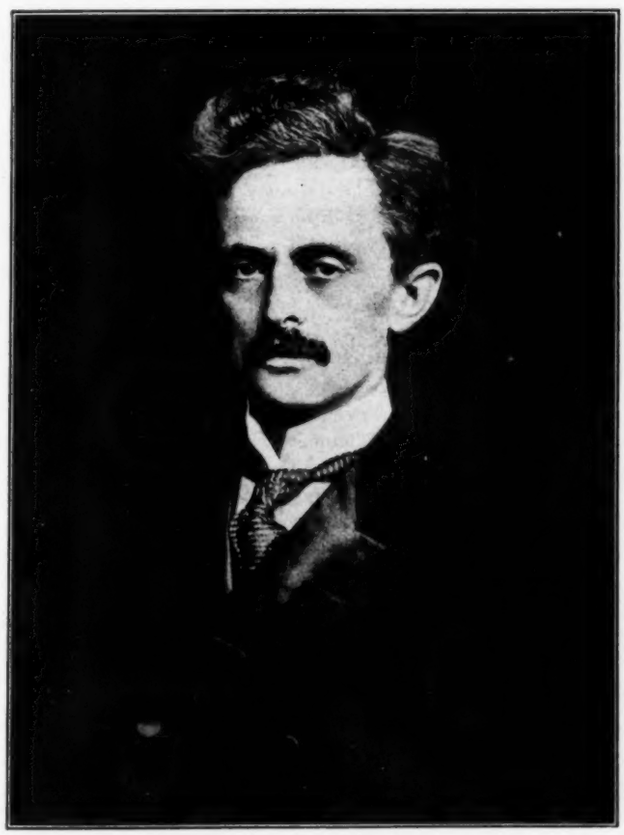
### F. S. Pearson.

Among Americans who have been interested in the engineering work in Mexico, there is none whose name has been more intimately associated with the development of the vast resources of the country than that of Fred Stark Pearson, of New York. Dr. Pearson spends a considerable part of his time in Mexico, where the investments of the several corporations of which he is the head aggregate $110,000,000 gold. In the electrical field alone in Mexico the Pearson interests have invested upwards of $60,000,000 gold. Plans already adopted by Dr. Pearson and his associates call for the further expenditure of many millions of dollars in the enlargement of their various enterprises in that country.

The recent entry of the Pearson interests into the railway field of Mexico has served to bring the head of these great industrial enterprises in this country to special notice. He is apparently able to command an unlimited amount of capital for the great projects which his active brain is busy conceiving. The great things that have been accomplished by Dr. Pearson are little known outside of a narrow industrial world, but his life activities cover a field that embraces Canada, the United States, Mexico and Brazil.

Dr. Pearson is a native of Lowell, Mass. He was educated at Tufts College, Mass., and was subsequently lecturer in chemistry and electrical science and at a still later date, instructor in higher mathematics and civil engineering. After leaving college, he became manager and civil engineer of the Somerville Electric Light Company and chief engineer of the West End Street Railway system of Boston, at which time the electrification of the system took place.

His next activity was the organization of the Dominion Coal Company at Cape Breton, Canada, one of the largest in the world, at the same time being consulting engineer for the Montreal Street Railway system, superintending the electrification of its lines. He next organized and built the Halifax Tramway system and thereafter carried out the engineering work in connection with the New England Gas and Coke Company, one of the largest of its kind in the United States, lighting not only the city of Boston, but practically all of the cities of eastern Massachusetts. He then became consulting engineer of the Metropolitan Street Railway Company of New York, and it was under his direction that the lines were equipped with the underground cable system and thereafter changed over to electricity. At this time also he became chief engineer and superintended the reconstruction of the surface lines in Brooklyn, now part of the well-known Brooklyn Rapid Transit system.



FRED STARK PEARSON,
Who Has Largely Contributed to the Development of Mexican Resources.

Then came the invasion of foreign fields. In conjunction with Canadian capitalists, he organized a company for the acquisition of the light and power franchises in the city of Sao Paulo, Brazil, and successfully established that enterprise, which is a model of its kind and a splendid success in every way. Financially it has been a great success, its common stock now paying dividends at the rate of ten per cent per annum. Long before the Sao Paulo enterprise was completed, Dr. Pearson's attention was directed to Mexico City, where, after careful investigation, the project was undertaken for the establishment of the present splendid hydroelectric installation at Necaxa and the unrivalled electric street railway system in the capital. Although constructed by separate companies, the interests of both have been merged in the Tramway Company by that company acquiring the majority control of the Mexico Light and Power Company. Dr. Pearson is president of both.

The Necaxa power plant, when completed, will be the largest single installation in the world. Problems of the greatest engineering difficulty have been successfully overcome here, and Dr. Pearson has received much praise for the results attained. With the work in Mexico well under way, Dr. Pearson's energies were next directed toward the consolidation of the street railway systems, gas plant, electric light and telephone systems of the city of Rio de Janeiro, Brazil, and supplying the city with power. With characteristic courage and energy, the new project was undertaken and the result is that today this very southern city is equipped with the most modern and up-to-date facilities in connection with the operation of its public franchises.

Between frequent trips to Brazil and Mexico, Dr. Pearson has found time to plan and superintend the water power installation of the Electrical Development Company at Niagara Falls, Ontario, Canada, which supplies Toronto, 100 miles away, with light and power. He also superintended the hydroelectric installation at Winnipeg, Canada.

Dr. Pearson's latest enterprise is the consolidation of three railway systems in the northern part of Mexico, namely, the Chihuahua and Pacific; the Sierra Madre and Pacific and the Rio Grande, Sierra Madre and Pacific.

### Chicago Electric Club.

At the regular noon meeting of the Chicago Electric Club on Wednesday, May 4, the minutes of the meeting of the board of managers which were read showed something of the steps that are being taken toward co-operation with other similar clubs. At this board meeting it was moved and passed that members of the following Electric Clubs be admitted to all regular meetings of the Electric Club of Chicago: League of Electrical Interests, St. Louis, Mo.; Omaha Electric Club, Omaha, Neb.; Electrical League of Cleveland, Cleveland, Ohio; Colorado Electric Club, Denver, Colo.; Electrical Boosters' Club, Pittsburg, Pa.

It was further suggested that the secretary correspond with the following Electric Clubs with a view to an exchange of courtesies: The Electric Club of Indianapolis, Ind.; Gopher Club, of Minneapolis, Minn.; Electric Club of Boston, Mass.; Los Angeles Electric Club, Los Angeles, Cal. Motion was also made that the secretary and treasurer prepare a suitable form of yearly membership card, and that such cards should be issued to all members in good standing.

The speaker of the day, John Ferguson, of the Commonwealth Edison Company, who was introduced by Frederic P. Vose, spoke on the subject of salesmanship and of the value of tact in dealing with dissatisfied customers. He commented on the fact that these subjects were daily receiving more attention. The matter has been taken up in schools, and is growing to be of considerable importance. In 1903 the subject was first taken up in the discussion of the National Electric Light Association. Until that time papers read before the body were of a purely technical nature, as the importance of pleasing the public and of seeing that they were satisfied with the service supplied was not considered.

At the present time there may be said to be three ways in which the public communicates with the public service corporation, namely, by personal interviews, letter writing and telephone. Of these the personal interview does not need to receive so much consideration as letter writing, or the use of the telephone. It is easy to be polite when talking face to face with a customer. The telephone companies are now recognizing the value of diplomacy in dealing with their subscribers and this appears in the increasing politeness of telephone operators. The operators have been educated and the telephone companies are now educating the public by means of pamphlets. Should these be followed there would be little or no trouble with the operators.

Mr. Ferguson, to illustrate a point, read a letter received from an irate customer, and told something of his methods of dealing with this class of patrons.

It is the general feeling of the heads of public service corporations that they should be accessible to the public at all times, and it is not with these heads that the fault is generally found, but with the younger clerks who do not realize the importance of friendly relations with their cusomers. A case was cited of the diplomacy used by one particular "cut-off" man employed by the Commonwealth Edison Company. Although this man's duty was to cut off the service in case the customer refused to pay bills, he came back in nearly every case with payment for the service and with assurance that the customer was satisfied. Sometimes the office men can learn much in the way of tact from the outside men.

At the conclusion of Mr. Ferguson's talk, a vote of thanks was extended to him by the club.

### Meetings of Electrical Manufacturers' Club.

The semi-annual meeting of the Electrical Manufacturers was held at Hot Springs, Va., during the past week, the opening session being held on May 12. There were about forty representative electrical manufacturers in attendance. Sessions were open only to members of the association. The officers are as follows: President, Dana R. Bullen, General Electric Company; vice-president, B. M. Downes, Brookfield Glass Company; treasurer, Herbert Sinclair, Star Porcelain Company. The vacancy in the secretaryship will be filled at this meeting.

### Electric Power in the Hoosac Tunnel.

Plans are under the consideration of the Boston & Maine Railroad for the elimination of coal and oil-burning locomotives in the Hoosac Tunnel in Massachusetts. Should the change be made, a power plant will be established near South Adams and the tunnel will be lighted and ventilated by means of electricity and only electrical engines will be used to draw the trains through the tunnel.

### Sanitary Board to Light Chicago Streets.

At a meeting in Chicago on Tuesday, May 10, an agreement was practically arrived at between the representatives of the city and the Sanitary District relative to doubling the street lighting of Chicago and thus making this city the best lighted in the world.

Alderman Snow on behalf of the city submitted a proposition the chief provisions of which were substantially as follows:

Cost of building transmission lines, conduits, cables, poles, lamps and other equipment to be paid by Sanitary District.

Sanitary District to furnish all power needed for arc lights now operated by city and 10,000 additional arc lights at $15 per horsepower annually.

Sanitary District to operate all substations and transmission lines owned by the city.

Sanitary District to furnish transmission lines and substations for additional lighting free of charge.

City to pay annual interest on the money used for extensions and changes at the same rate as the Sanitary District will pay on the bonds issued for the purpose.

The city to allow the Sanitary District the use of transmission lines when not used for street lighting.

Another conference was arranged to be held at 11:00 a. m., Saturday, May 14.

### Electric Pumping in New Mexico.

The Deming Ice and Electric Company, of Deming, N. M., believing in the adaptability of the electric motor to the needs of the community recently ordered a carload of motors and transmission wire. Power for motor-driven pumps will be supplied to the farmers in the vicinity, and so great has been the demand that the company has already contracted for its entire capacity.

The company guarantees its larger motors to furnish water at less than one cent per thousand gallons and at the same time agrees to keep the apparatus in repair.

### Underground Telegraph Cable.

The British Postmaster General has announced that provision will be made in the coming estimates for an underground telegraph cable to connect the cities of Leeds and Hull, Yorkshire, England.

# An Electrically Operated Reversing Blooming Mill.

## A Recent Example of German Rolling-Mill Practice.

The iron and steel works recently erected in connection with the Georgs-Marien-Hütte Metallurgical Works is one of the first large establishments of this kind from which all boiler plants or steam pipes with their many drawbacks are entirely banished, the whole of the machinery and apparatus being operated by electricity (550 volts, direct current) supplied from blast-furnace-gas-driven generators. Other uses to which the gases are put to are for the operation of the heating and smelting furnaces.

These works further comprise the first German reversing blooming mill to be operated by electricity. The electrical equipment of this unique plant was supplied by the Siemens-Schuckert Works, and during about six months' operation has given every satisfaction in spite of the many novel and difficult problems which had to be met in its design.

The mechanical part of the blooming mill (see Figs. 1 and 2) was constructed by Thyssen & Company. Its rolls are 900 millimetres (35.43 inches) in diamter with a length of 2,250 millimetres (88.6 inches). It had been intended at first for dealing with ingots of 450 to 500 millimetres diameter and an average weight of 2.5 tons, reducing them to 100 millimetres (3.94 inches) square; however, this weight was actually increased to about five tons without any inconveniences being experienced in connection with the roll train or electrical operation.

The housings for the blooming rolls are strongly cross-connected by heavy cast-steel bars. The base plates supporting the roll housings are not connected to the base plates of the spindle housing, while the two housings are coupled together by means of two substantial unbalanced cast-steel spindles (Fig. 2). The spindle housing comprises wrought-iron spindles, fitted with milled teeth, staggered, of 1,000 millimetres (39.37 inches) diameter and 1,800 millimetres (70.87 inches) length. The gearing rests in bearings of very ample dimensions, provided with lubricating oil circulation so as to reduce the wear and tear.

After being uniformly heated in pit furnaces, the ingots are placed by a crane on a tilting jack which is capable of slow tilting and rapid erecting (both operations being carried out automatically). Thence the ingots are placed on the roll train and thus supplied to the rolls. The roll trains, whose housings are built of hollow castings supporting the bearings, are operated by series motors of forty horsepower at about 510 revolutions per minute. These motors have been combined in sets of two each (Fig. 3) with a view to operating the working roller tables in front of and behind the mill, respectively,

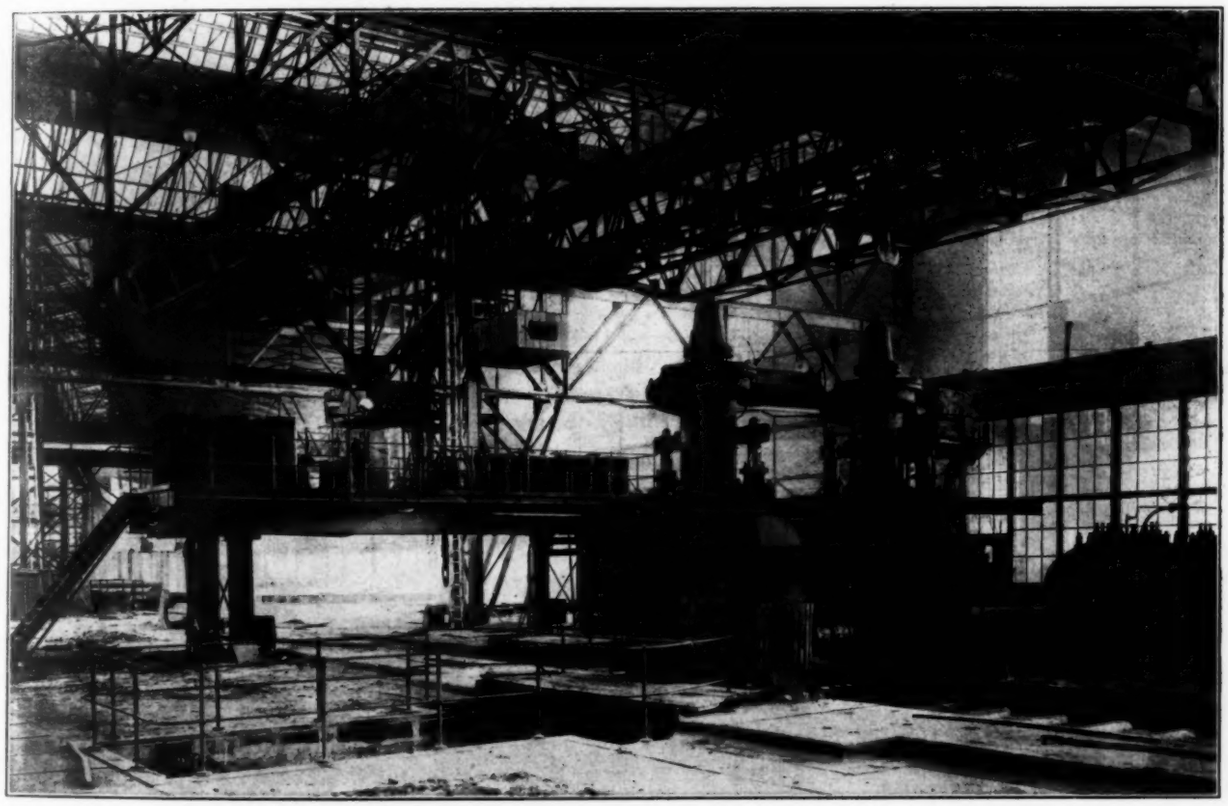


FIG. 1.—GENERAL VIEW OF THE BLOOMING MILL AND CONTROL PLATFORM.

while care has been taken to allow both roller tables, after throwing in a clutch, to be operated in common from either of those sets. The same type of motor has been used for setting the upper roll, which is balanced through a special accumulator by four hydraulic cylinders located on the top, and the whole of the rolling mill proper contains only this one type of motor which, by the way, has been used in many other departments of the works.

In order to allow the ingots to be turned and displaced, there has been installed in front of the roll a hydraulically-operated edging device with four readily exchangeable vertical cams. As the whole mechanism has been arranged at the side of the working trains, it is

FIG. 3.—TWO SERIES MOTORS OPERATING WORKING ROLLER TABLES.

safe against any dropping rubbish and is readily accessible.

Some difficulty was experienced in designing the shears intended for cutting ingots of 300 millimetres diameter, there being no steam available, while a direct coupling to the motor or hydraulic reservoir of fifty atmospheres pressure was not desirable owing to the uneconomical operation. Shears with a driving gear operated by compressed air, generated in an electrically-driven compressor and accumulated in an old boiler, were therefore installed, the normal air pressure being six atmospheres (in excess of atmospheric pressure). Whenever this figure is exceeded, the compressor motor is stopped automatically, and whenever it drops below four atmospheres it is automatically started.

The shears are constructed on a patented system with applied movable upper knife and cutting lower knife, thus doing away with the necessity of fitting a tilting device into the roll train. Two movable cast-steel knife-holders slide in a heavy cast-iron frame. The upper one of these knife-holders is applied to the ingot to be cut, while the lower one, under the action of water under pressure generated in the compressed-air "multiplier," makes the cut in an upward direction. The control has been designed for the air-admission channel of the compressed-air cylinder to be locked automatically when about half of the ingot has been cut through. After making the cut at maximum speed, the two knife-holders return automatically to their position of rest, while the air outlet is opened automatically. The air consumption of the shears obviously depends upon the cross-section, temperature and hardness of the material to be cut, that is to say, on the resistance offered by the ingot. The pressure in the compressed-air apparatus or multiplier cannot be any higher than corresponds to the continually decreasing resistance which is acting against it, and in accordance with which it is controlled automatically, until expansion sets in after automatically cutting the air admission. Diagrams recorded in the cutting of ingots at normal rolling temperature allow the air consumption to be ascertained in each case.

FIG. 2.—VIEW OF BLOOMING MILL SHOWING ROLL TRAIN.

A double electric motor, directly connected to the upper spindle through a split coupling, is used to operate the blooming rolls. Fig. 4 strikingly illustrates the connection of the motor with the rolls, the double motor and spindle housing being located on a common heavy foundation frame at such a level

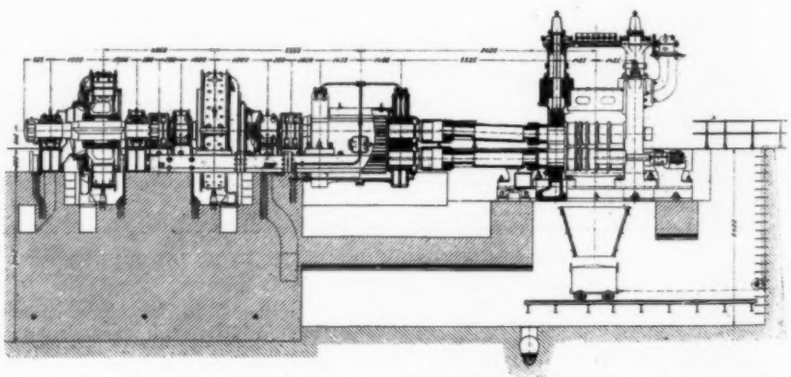


FIG. 4.—CROSS-SECTION SHOWING CONNECTION OF DOUBLE MOTOR TO BLOOMING ROLLS.

as to prevent any tilting due to the motor torque, as was the case in connection with previous designs. Each of the two armature shafts of the double motor runs in two ring-lubricated bearings, both being connected together between the intermediate bearings by a substantial clutch of the same design as used in connecting the motor to the spindle. The free shaft end of the double motor has been designed for receiving a clutch which allows each of the motor shafts and armatures to be substituted for the other.

To protect against the dust and moisture unavoidable in rolling mills, the double motor has been installed in a light iron framework and glass structure, as shown in the interior view, Fig. 5, and from the exterior at the right and left, respectively, of Figs. 1 and 2. The same structure contains the electrically-operated compressor which is mentioned in connection with the ingot shears, and the switchboard to which this compressor motor and the secondary motors of the blooming mill are connected.

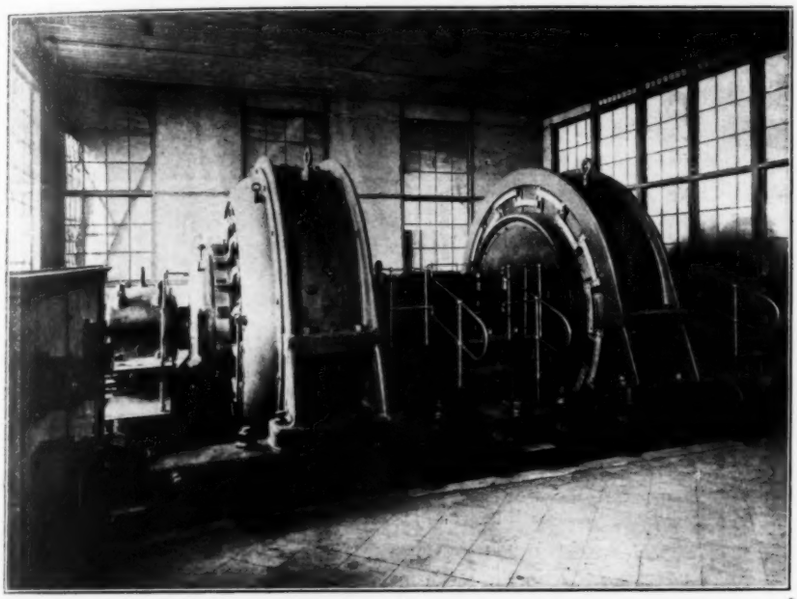


FIG. 5.—DOUBLE MOTOR FOR DRIVING BLOOMING ROLLS.

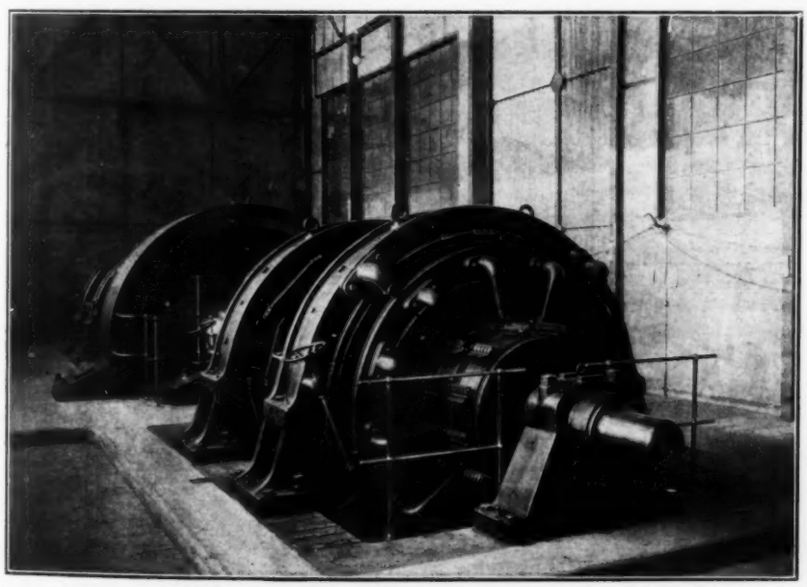


FIG. 6.—MOTOR-GENERATOR CONTROLLING SET—ONE MOTOR, THREE GENERATORS AND ONE FLYWHEEL.

The double motor is of the direct-current, shunt-field, commutating-pole type, the two armatures being able to yield to the common shaft torques of up to 85,000 meter-kilogrammes, with a speed of up to sixty revolutions per minute. Its output on the motor shaft thus works out at about 7,000 effective horsepower, while being readily exceeded whenever required by thirty to fifty per cent without resulting in any damage, as borne out by practical experience. As the blooming mill was not yet built when the electric drive was ordered, and as the energy consumption of the rolls accordingly could not be ascertained with a steam engine, while on the other hand no electrically-operated reversing mill allowing the energy consumption to be measured was available at the time, this factor was determined on the basis of experiments made in 1903 by Mr. Koettgen, director of the Siemens-Schuckert Works, upon a steam-operated reversing blooming mill at the Gute-Hoffnungs-Hüte. It is interesting to note that there was a close agreement, in all essential features, of the results then ascertained with the results of experiments subsequently made on this rolling mill.

Owing to the subdivision of the rolling-mill motor into two motor units, the diameter of the double armature, and accordingly the flywheel masses of the latter, could be reduced considerably. Moreover, an artificial armature ventilation means of two electrically-driven ventilating fans installed in the cellar was provided, thus still further increasing the output of the motor as compared with its diameter. However, experience has shown that the motors do not become greatly heated even without this ventilation. Owing to the reduction in the weight of flywheel masses, the motors can be reversed more swiftly and with smaller energy consumption, the former of which is of special importance in the operation of rolling mills.

The mechanical construction of the double motor fully agrees with all the requirements of operation. The active iron, for instance, is secured on the armature hub in a much more rugged manner than in the method used in connection with machines of uniform direction of rotation, and the same applies to the mounting of the coils in the armature, which has been carried out with special care. These features were

mainly responsible for the success of the construction.

The Ilgner system, as used in connection with hoisting plants, is used to control the roll train. A short description of this system, illustrated by the diagram of connections in Fig. 7, will be given in the following:

The direct current generated at 550 volts in the local blast-furnace gas-engine power house is led by a number of underground cables to the main distribution switchboard of the steel works and rolling mill, to which the various departments of the latter, including the blooming mill, are connected. However, the rolling-mill motor, instead of being supplied with current directly from the switchboard, is fed through the intermediary of a flywheel controlling set (Figs. 6 and 7) made up of four identical direct-current machines coupled together with a heavy high-speed flywheel between the two middle machines. One of these four machines (*a* in the diagram of connections) is used as the motor driving the whole motor-generator set, and as such is able permanently to yield 1,300 effective horsepower, with a speed rotation of 350 to 450 revolutions per minute. The three remaining machines, *b*, *c*, *d*, working as generators, are used in series to generate the direct current of variable voltage required by the rolling-mill motor. Each of these three dynamos is able to generate potentials up to 500 volts, so that the maximum potential in the rolling-mill circuit will be 1,500 volts, and the maximum potential of each armature of the rolling-mill motor 750 volts. This subdivision of the dynamos is calculated to obtain a maximum speed of rotation, allowing the load to be compensated with relatively small additional flywheel masses. Another advantage of this subdivision is the possibility of providing for a very ample reserve, for as two of the four direct-current machines are susceptible of working either as motor or dynamo, there is always the possibility, in the case of a breakdown of the machine working as motor, to replace this (after some alteration of connections) by another machine which had been used so far as a generator, two-thirds of the output being still obtainable for keeping the rolling mill going.

The total weight of the flywheel, *f*, which has been designed as a substantial cast-steel disk, is thirty-five tons. It is supported by two ring-lubricated sliding bearings, and its maximum peripheral speed, with a maximum of 450 revolutions per minute, is about ninety metres per second. Each of the electrical machines arranged symmetrically on both sides of the flywheel is connected to the latter by an elastic clutch, Fig. 8. These clutches with these high speeds have to deal continually with alternating impulses of up to 6,000 effective horsepower and possess some remarkable features. They are made up of two cast-steel disks, into one of which conical round rods of special steel are fitted axially in a circle, the free ends of these rods engaging with the corresponding bearings in the other disk of the clutch. By the resilience of these steel rods, a deflection of the two shaft centers on both sides, especially in an axial direction, is taken care of, and another advantage afforded is that the back pressure of the shafts to be connected on the neighboring bearings, corresponding to a given eccentricity, can be accurately predetermined, thus avoiding any un-

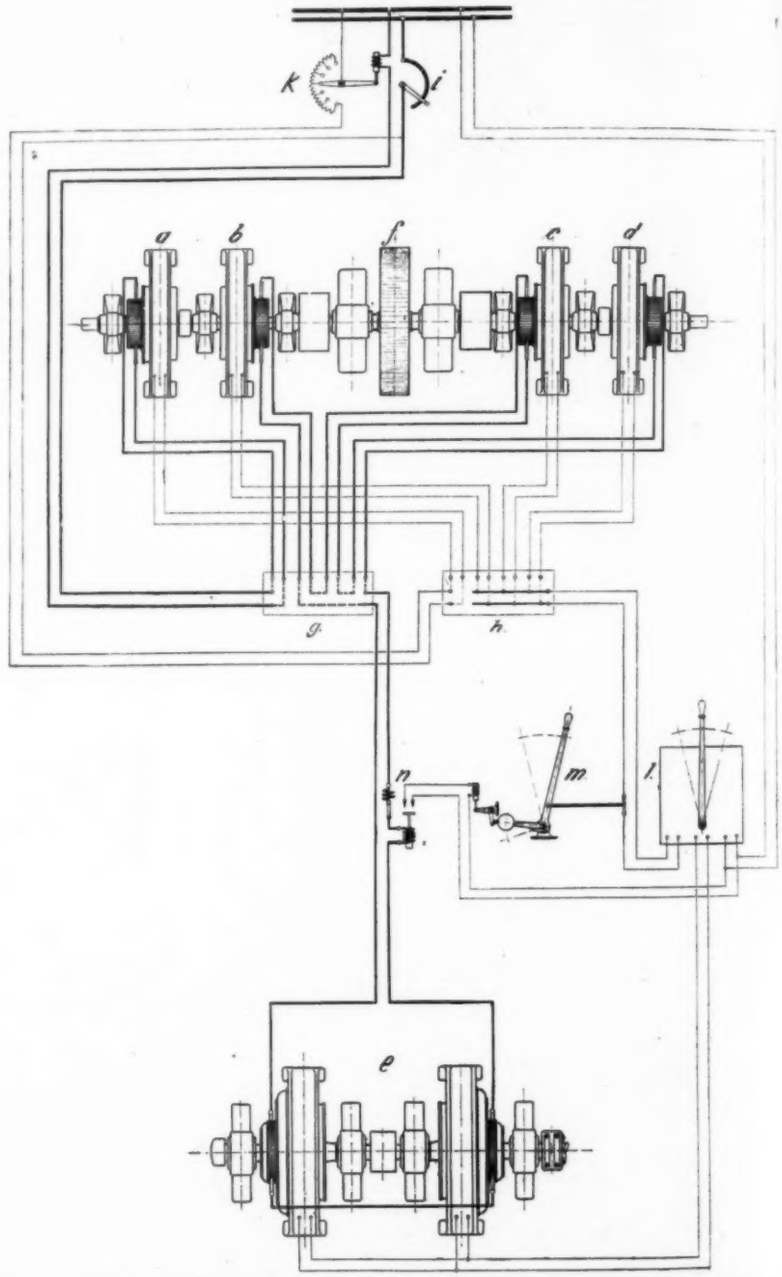



FIG. 7.—SCHEME OF CONNECTIONS OF MOTOR-GENERATOR CONTROLLING SET AND DOUBLE MOTOR FOR BLOOMING ROLLS.

due strain on those bearings. This construction has given complete satisfaction in spite of the extraordinary exacting conditions of service.

The speed of the rolling-mill motor,

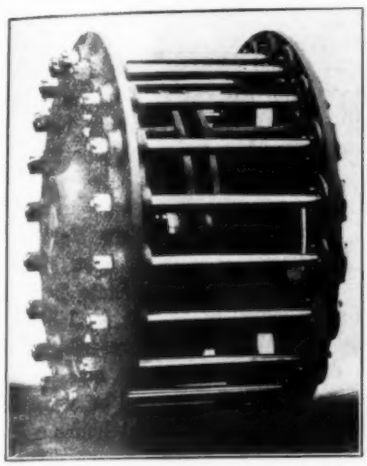


FIG. 8.—FLEXIBLE CLUTCH OF THE FLYWHEEL CONTROLLING SET.

when using the Ilgner system, is controlled by what is called the Leonard connection, by which the voltage of the controlling dynamos feeding the motor is altered at will between a positive and negative maximum, by controlling their shunt fields. As the speed of a shunt motor (such as this rolling-mill motor) depends mainly upon the armature voltage supplied, each position of the controlling lever, which adjusts for a certain voltage of the controlling dynamos by influencing their shunts, will correspond approximately to a given speed of the rolling-mill motor. By moving the controlling lever, *l*, in a forward direction (positive excitation of the controlling dynamos) the speed of the rolling-mill motor will be increased in one direction, and by moving it back (negative excitation of the controlling dynamos) the speed of the same motor will be increased in the reverse direction. The regulating machine thus controls with one lever both the direction and speed of rotation of the rolling-mill motor, an additional advantage being that in drawing the controlling lever back to zero, the rolling-mill motor, which is still running at a higher speed, will restore some current to the controlling dynamos (whose voltage has already been reduced), thus being braked practically instantaneously, while allowing this restored electrical energy to be recovered in the shape of an acceleration of the flywheel. Practically no losses are thus entailed by braking the rolling mill, in contrast to what is the case with steam-operated rolling mills.

In the present case, the engineers confined themselves to regulating the speed of the double rolling-mill motor by altering the voltage of the controlling dynamos within a range in either direction of sixty revolutions per minute of the double motor. Whenever higher speeds (up to say ninety revolutions per minute) are required in connection with the last strokes on the ingot, the operator by turning the control lever farther will throw in resistances into the exciter circuit of the rolling-mill motor, which is fed directly from the main switchboard, and by thus weakening the field of the motor will increase its speed. This process is quite admissible, as, in connection with the last strokes the torque required to be performed by the motor decreases.

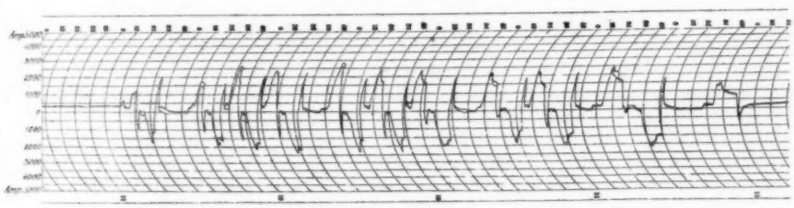


FIG. 9.—CURRENT INPUT OF THE DOUBLE MOTOR.

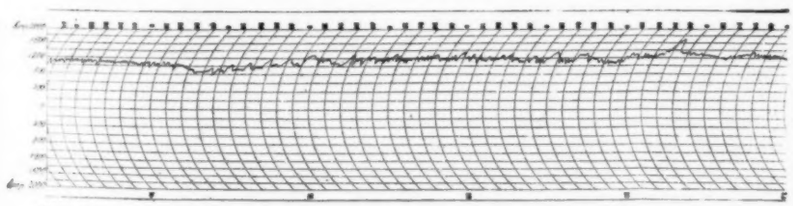


FIG. 10.—CURRENT INPUT OF THE FLYWHEEL MOTOR-GENERATOR SET.

An emergency switch, a maximum current relay and a self-acting circuit breaker have been provided for any exceptional cases. The emergency switch, *m*, operated by a hand lever, allows the excitation of the controlling dynamos to be interrupted, thus suddenly adjusting their voltage to zero and instantaneously arresting the motor. The same emergency switch can, however, be disengaged also by the maximum current relay, *n*, as soon as the current traversing the armature circuit of the rolling-mill motor, *e*, exceeds the admissible limits, and the self-acting circuit breaker, in cases of extreme emergency, protects the motor against any short-circuit occuring in the armature circuit. Neither of these devices has so far been called on to operate.

Two special regulating apparatuses, designed by the Siemens-Schuckert Works, are worthy of especial mention. One of these is intended for obtaining a uniform current input to the controlling motor-generator set, in spite of heavy and continual oscillation in the energy input of the rolling-mill motor. Oscillations of fifteen to twenty per cent in the speed should be provided for in order to cause the flywheel of the controlling machines to be actuated, thus utilizing the energy stored in the flywheel mass. The motor driving the flywheel controlling set has therefore to be compelled, in spite of fluctuations in its speed, to absorb a practically constant current. This is effected by an automatic shunt field regulator (*k*, in Fig. 7), which throws resistance in and out of the shunt circuit of the motor whenever the current intensity differs from the average figure to be adjusted for. If the ingots are to be rolled out to a relatively small increase in length at a relatlvely slow speed, the regulator is adjusted to an average current input of about 700 to 800 amperes, whereas in the case of ingots to be rolled out to considerable length at a high speed, the average current input can be adjusted to 1,400 to 1,600 amperes and upwards.

The second regulator is designed for allowing of a reversal as rapid as possible. The self-induction inherent in the field coils of the controlling dynamos will oppose any alteration in the intensity of the exciting current, thus retarding the production of the required dynamo voltage. Now, the regulator in

question practically neutralizes the effects of self-induction, thus allowing the roll train when empty to be reversed twenty-eight times every minute from sixty revolutions per minute in one direction to the same speed in the reverse direction, which is far in excess of actual requirements of operation. It is mainly due to the voltage of the controlling dynamos being adjusted instantaneously in accordance with the position of the controlling lever that in addition to the usual safety switches no special safeguards against overloads on the roll train had to be provided. The same fact also accounts for the maximum current switch not having so far been operated. In fact, the control of the rolling mill was found to be so simple as to be left to the operator from the very first day of running.

Fig. 1 shows the arrangement of the controlling apparatus on the control platform, situated thirty-six feet in front of the roll train. To the right of the operator is installed the main controlling lever and to his left the handle of the emergency switch. Further to the left are the controlling levers of the hydraulic edging device and the controllers of the roll trains and rolls. On the railing of the control platform are installed at the level of the eye various measuring instruments indicating the actual current intensity, voltage and speed of the rolling-mill motor, without interfering with the operator's view of the roll train.

Two or three months after starting this rolling mill, engineers of the Siemens-Schuckert Works and the Georgs-Marien-Hütte undertook some comprehensive tests with a view to ascertaining the efficiency and ease of control as well as the energy consumption of this electric drive. By finding the ratio of the effective rolling work done to the total electrical energy absorbed, the efficiency of the electric drive was ascertained.

The variable current intake, voltage at terminals and speed of the rolling-mill motor were recorded by means of self-registering instruments on the one hand, and the variable current intake and speed of rotation of the flywheel controlling machine set with constant voltage on the other. At the same time the energy consumption of the roll train was measured by appropriate instruments.

Whereas the electrical instruments immediately yielded any data required in regard to the behavior of the electric drive, the following observations were made with regard to the rolling process itself:

The weight as well as the initial and final dimensions of each ingot were determined and the lengthening obtained after each stroke was ascertained. The temperature of ingots was read by means of a Wanner pyrometer after each second stroke. The chemical composition, as required for gauging the hardness of the material, was derived from chemical analysis. The ingots used were 2,200 to 2,675 kilogrammes (4,840 to 5,885 pounds) in weight, their initial diameter being 500 millimetres (19.7 inches) at the lower end and about 450 millimetres (17.7 inches) at the upper end, and the final diameters being intermediate between 270 and 100 millimetres, corresponding to a three-fold to 21.8-fold lengthening.

The results of the experiments showed conclusively that the aims of the designers were more than fulfilled. The remarkable ease of control was demonstrated by the fact that the double motor coupled to the rolls could be reversed twenty-eight times per minute from a speed of sixty revolutions per minute in one direction to the same speed in the opposite direction. A complete reversal thus takes up only about two seconds. It was found that on reversing between + 90 and — 90 revolutions per minute, fourteen complete reversals per minutes could be obtained. Figs. 9 and 10 strikingly illustrate the difference in the current consumption of the rolling-mill motor whose power input continually varies within wide limits of thousands of horsepower, and the load on the power station represented by the current intake of the flywheel motor-generator controlling set which, in spite of these fluctuations, is maintained practically uniform.

The total energy consumption of the rolls and the mechanical work done were determined with different outputs in connection with a variable lengthening of ingots. The total efficiency in the case of maximum output averages about sixty per cent, decreasing only slowly in the case of decreasing outputs. In fact, in the case of an output of one-half the full amount, it is about fifty per cent and in the case of one-quarter, about forty per cent. This shows that even in the case of a considerable diminution of the output, an electrically-driven reversing mill can still be operated quite economically.

The safety of operation is characterized by the fact that in rolling out heavy ingots of 540 to 600 millimetres in diameter, current inputs of up to 6,750 kilowatts (4,500 amperes with 1,500 volts) were frequently observed in the rolling-mill motor, which currents both the dynamos and motors were able to carry easily.

### New York Labor Law Valid.

A decision has just been handed down by the New York State Court of Appeals which holds that the labor law passed in March, 1907, prescribing that no telegraph operator in charge of a railway block signal shall be compelled to work more than eight hours a day, is valid. This decision means that any railroad which compels or even permits one of its block signal operators to work more than eight hours in twenty-four can be prosecuted.

The decision is regarded as a significant victory for the railroad operators, as the men who are at the telegraph keyboard have contended that many accidents which have happened had been due to long hours imposed by the railroads upon them.

### Charleston Railway.

In order to take care of the present needs of the Charleston Consolidated Railway, Gas and Electric Company, of Charleston, S. C., and to provide for contemplated extension and betterment, a new company, to be known as the Charleston Consolidated Railway Lighting Company, has been incorporated, capitalized at $2,000,000. The new company will lease for a period of ninety-nine years the property and franchises of the present company, and will guarantee dividends on its stock. The old company will issue $500,000 of six per cent preferred stock, which it will sell at par to the new company, using the proceeds to provide for the extensions and betterments which have been planned.

The local interests hitherto identified with the company remain as they are at present, but considerable new capital from outside sources has been introduced. P. H. Gadsden will continue, as in the past, to be the executive head of the properties.

# American Electrochemical Society.

## Successful Convention at Pittsburg, Pa., May 4, 5, 6 and 7.

The seventeenth general meeting and eighth annual business meeting of the American Electrochemical Society was held at Pittsburg, Pa., May 4 to 7, and was a banner meeting. The local committee arranged a very successful programme and the visiting members and guests, to the number of over five hundred, voted it the best meeting yet held by the society.

Friday was devoted entirely to visits to industrial plants, a special train being provided for the trip, which included stops at the works of the Allegheny Plate Glass Company, the Westinghouse Machine Company, the Firth-Sterling Steel Company, and the Homestead Works of the Carnegie Steel Company.

One of the most interesting objects seen on this tour was the new two-and-one-half-ton Héroult electric steel furnace recently installed at Demmler by the Firth-Sterling Steel Company. This is the first electric furnace installed in the Pittsburg district for the making of steel, and is but the forerunner of many others which will doubtless be put into operation in the near future. In this furnace the arc is formed between the bath of metal and the two graphite electrodes which are suspended over it, and the furnace consumes about 250 kilowatts. Single-phase, sixty-cycle alternating current is used and is stepped down to 110 volts by transformers from the 11,000-volt mains. This furnace produces steel equal in quality to crucible steel, at a cost little greater than open-hearth steel.

On Wednesday afternoon a visit was made to the testing station of the United States Geological Survey where special tests were made to illustrate the work done.

On Thursday several visits were made to the Nernst Lamp Works, the Isabella Furnaces of the Carnegie Steel Company, the Park Works of the Crucible Steel Company of America, the Pittsburg Reinforced Brazing and Machine Company, the Jones & Laughlin Steel Company, the Pennsylvania Smelting Company, and the Universal Portland Cement Company.

A ladies' committee provided entertainment for the visiting ladies in the form of automobile trips, a theatre party, excursions to the art galleries, museum, the Margaret Morrison School, and to some of the industrial plants.

The first session of the meeting was opened at the Fort Pitt Hotel at 10:30 a. m. May 5, President Baekeland in the chair. Addresses of welcome were made by E. K. Morse, president of the Engineers' Society of Western Pennsylvania, and by C. F. Scott, chairman of the local committee. The report of the secretary showed that the membership at the end of 1909 was 1,066, an increase for the year of thirty-seven per cent. The finances were also reported to be in good condition. The Committee on Dry Cells reported "progress."

The following officers were declared elected as the result of the mail ballot: President, W. H. Walker; vice-presidents, E. F. Roeber, S. S. Sadtler, L. Kahlenberg; managers, C. F. Burgess, C. P. Townsend, W. R. Whitney; treasurer, P. G. Salom; secretary, J. W. Richards.

It was also announced that the formation of a Chicago Section had been authorized by the Board of Directors.

The first paper on the programme was by Carl Hering on "Determinations of the Constants of Materials for Furnace Electrodes," and described the details of carrying out a method previously proposed by him.

EMPIRICAL LAWS OF FURNACE ELECTRODES.

A second paper by the same author on "Empirical Laws of Furnace Electrodes" dealt with a closely related subject.

The experiments consisted in imbedding a rod of the material to be tested in a heat-insulating material, allowing the two ends to project sufficiently for terminals. A steady current is then passed through it which will heat it; it becomes hottest midway between the ends. The temperatures at the middle and at the ends, the voltage at the two ends, and the current, are then measured. From these data all the necessary physical constants are then calculated. The mean resistance is the quotient of the volts and the amperes; from this and the size of the rod, the mean resistivity is calculated. The product of the volts and amperes gives the heat flow in watts, which flows out at the two ends, and from this and the dimensions the heat conductivity is calculated. The rod is equivalent to two electrodes butting together at their hot ends, the interior of the furnace itself being omitted; hence the entire flow of heat is that due to the resistance of the electrodes, which is the condition under which a well-proportioned electrode should operate. The rod is assumed to be perfectly heat-insulated; this is nearly accomplished by surrounding it with a cage of similar rods through each of which the same current passes. A stable state of temperature is of course essential, and the calculated constants are the correct mean values under electrode conditions; these mean values represent those which an equivalent electrode would have whose conductivities are the same from end to end. The high temperatures were measured with a platinum-platinum-rhodium thermo-couple made especially for this test with long wires, the electromotive forces being measured with a potentiometer, thereby avoiding the error due to a current. The use of a potentiometer with this thermo-couple also enabled widely different temperatures and small changes in them to be measured with very great accuracy. The results obtained have been already published in papers read at a previous meeting and elsewnere. An attempt is here made to find whether any of the physical properties involved follow some general laws. The currents have therefore been reduced to the equivalent values for a certain definite diameter and length, and the outside temperatures (terminal) to 100 degrees centigrade. The volts refer to a single electrode. It has been already shown that neither thermal nor electrical conductivity alone is a true measure of the good or bad qualities of electrode materials, but that the product and the quotient of these two quantities are the important values. The loss of power is determined by the quotient of these, that is, by the product of thermal conductivity $k$ and electrical resistivity $r$: while the proportions of the electrode are determined by the value of the quotient $r/k$. Even these quantities may, in the author's method, be displaced in practice by two others depending upon them, thus simplifying the calculations. One of these quantities is the drop of potential in volts between the two ends of an electrode operating normally under the specified conditions, or $E=\sqrt{2krT}$, where $T$ is the drop in temperature between the two ends of the electrode. The other quantity is the section per ampere per inch length, represented by $S^1=\sqrt{r/2kT}$. The total cross-section is therefore $S=S^1IL$. Curves are given showing the variation of $E$ and of $S^1$ with the drop of temperature for carbon, graphite, iron and copper. For $S^1$ these curves are hyperbolas, while for $E$ the metals give straight lines through the origin. Other curves are given showing the variation of resistivity $r$ and thermal conductivity, $k$ with the drop in temperature. The latter varies but little through the range used (curves extrapolated to 2,500 degrees centigrade), while the resistivity is nearly constant for carbon and graphite, but shows a linear variation with temperature drop for the metals. Curves plotted for the values of $rk$ and $r/k$ against temperature drop also show a linear variation. The numerical values of the various temperature-coefficients are summarized.

In the discussion J. J. Kennedy pointed out one bearing of these results upon the Wiedemann-Franz law, which expresses the ratio of electrical to thermal conductivity in terms of the abso-

lute temperature. Observations bearing on this are new for temperatures above 300 degrees centigrade. This law accounts for the lines representing $r\ k$. The fact that $r/k$ is also given by straight lines for the metals is explained by the fact that the curves show thermal conductivity constant at the higher temperatures.

H. W. Gillett gave some results showing very similar behavior with electrodes of carbon and graphite, whereas Hering's values indicated very different behavior.

In reply Carl Hering stated that Gillett's conditions do not meet the specifications laid down for his own work. Mr. Lidberg pointed out that the curves were extrapolated to 2,500 degrees centigrade from observations reaching only to 900 degrees.

HEAVY ALTERNATING-CURRENT CONDUCTORS FOR ELECTRIC FURNACES.

In a paper entitled "A Study in Heavy Alternating-Current Conductors for Electric Furnaces," R. C. Randall discussed the problems of skin-effect and inductance, pointing out the difference in conditions according to whether direct or alternating currents be used. The shape of the conductor section and the influence of the form of circuit were also considered. For given area of cross-section, the best form for effective conductance is a very thin flat sheet, if alternating current be used. By making up a unit of a large number of separate small conductors, interlaced so that each averages the same position throughout the length of the transmission, skin effect is eliminated. The reduction of the self-induction in the circuit is the most important and most difficult, and its effect is proportional to the frequency used. Large inductance results in low power-factor which is an undesirable condition. It was shown that the maximum power in a system containing reactance occurs when the total resistance drop in voltage equals seventy-one per cent of the impressed voltage.

In the discussion, C. A. Hansen described some experiences with a 10,000-ampere furnace where the resistance of the leads increased the total resistance from 0.00188 ohm to 0.00202 ohm, while the reactance of the leads constituted 0.0017 ohm in a total of 0.0028 ohm. He also gave figures showing that the maximum power input of the furnace under constant voltage occurred with a power-factor of 0.71. M. G. Lloyd called attention to the use of tubular conductors for keeping down both skin effect and inductance. Concentric tubes of different sizes are used, and water may be circulated through the inner tube to cool it. Such a pair of conductors produces no external field, and a measuring instrument may be in close proximity to them without being affected by stray field.

A NEW ELECTRIC STEEL FURNACE.

A. L. Queneau read the next paper on "A New Electric Steel Furnace," in which he described a modification whereby the pinch effect was utilized to get circulation. The insulating material is burned magnesite laid in tar. C. A. Hansen stated that this material would get chalky at the temperatures used, and that he had also tried alundum with disastrous results.

INFLUENCE OF GASES IN STEEL.

P. L. Héroult read a short paper "On the Presence and Influence of Gases in Steel," in which he concluded that blowholes were caused by carbon monoxide and not by hydrogen, nitrogen or other gases. Carbon and iron peroxide are always present in steels manifesting blowholes. Carbon monoxide is formed from these on cooling and causes the holes, and further cooling results in a partial vacuum.

In the discussion the results of Boudouard and Belloc were quoted as showing that steel exhales gases only after a longer treatment than is usually given to it industrially, and by holding it at low temperatures.

J. W. Richards stated that 0.001 per cent of oxygen by weight would produce six per cent of blowholes by volume, and hence active efforts are made to eliminate the last 0.001 per cent of this gas.

ELECTROLYTIC PREPARATION OF MAGNESIUM.

S. A. Tucker read a paper, not announced on the programme, concerning "The Electrolytic Preparation of Magnesium."

A mixture of magnesium and potassium chlorides in molecular proportions is electrolyzed in a graphite crucible, using graphite electrodes, and at a low red heat the magnesium separates as a metallic sponge. The efficiency is about sixty per cent. No success was had with the use of the natural mineral nor with magnesium oxide dissolved in the chloride. Another scheme which was tried was first to get an alloy of magnesium with aluminum or copper, and separate the magnesium by a second operation. This procedure was not found advantageous.

SCIENCE AND INDUSTRY.

At the Thursday evening session, the presidential address was delivered by L. H. Baekeland on "Science and Industry."

The relation of these two fields of activity were dwelt upon by the speaker, and he traced the increasing dependence of industry on science in modern times. The immense industrial progress of Germany in the last century was attributed largely to the application of science brought about by the employment of trained scientists in industrial plants. The increased general knowledge of science has gone hand in hand with the general education of the people, and it is in those countries where modern economic, political and scientific ideas have been most widely disseminated that industries have flourished most successfully. It is not sufficient that knowledge should be monopolized by a learned class of the people; it is only by a general cultivation of learning that a people can keep up in the industrial race. India, China and Russia are examples of populous countries that fail in this respect. This country cannot better insure its future industrial supremacy than by encouraging a close intimacy between its scientific workers and its industrial establishments, and making the widest use of scientific attainments in the development of industry.

CHEAP POWER IN PITTTSBURG DISTRICT.

The president's address was followed by the reading of papers, first of which was "Possibilities of Cheap Power in the Pittsburg District," by Prof. F. Crabtree.

The speaker based his computations upon a price for natural gas of twelve to sixteen cents per 1,000 cubic feet, and for coal of one dollar or less per ton. Under these conditions power ought to be cheap. Considering the waste from present operations, Professor Crabtree stated that each beehive coke oven is wasting fifteen to twenty horsepower, and in the whole Pittsburg district about 450,000 horsepower is awaiting utilization. An investment of $80 to $100 per kilowatt capacity would be necessary to turn this oven gas to account in generating power, but the labor cost would be low, and the fuel cost zero. Allowing twelve per cent for fixed charges and figuring 8,760 hours to the year, the cost per kilowatt-hour at 100 per cent load-factor would be 0.25 to 0.27 cent, while at twenty-five per cent load-factor it would rise to one cent. In the blast furnace, about 150,000 cubic feet of gas are generated per ton of iron. About one-third to one-half of this is needed in the operation of the furnace, leaving a residue available for other purposes, which might furnish 600 kilowatt-hours per ton, at a cost of about one-half cent per kilowatt-hour. The independent production of power from natural gas, allowing a capital cost of $125 per kilowatt, would lead to a cost at the switchboard of 0.45 cent per kilowatt-hour for 100 per cent load-factor or 0.85 cent at thirty-three per cent load-factor. If producer gas were used the cost would be slightly higher. Using steam turbines, with steam generated from coke gas, the cost would be 0.4 cent at 100 per cent load-factor. To summarize, the cost in the Pittsburg district should be 0.5 to 1.2 cents, according to conditions, and hydroelectric plants do not do very much better. Pittsburg is well favored as to location, compared with other points. The price of power delivered depends upon transmis-

sion costs and can be estimated only for particular cases.

INDUCTION FURNACE PROGRESS.

This was followed by a paper on "Induction Furnace Progress," by T. Rowlands.

The Kjellin-Colby induction furnace, intended for melting purposes only, was first briefly described and its results compared with those of the old coke method of melting as followed in Sheffield, England. At an allowance of 750 kilowatt-hours per gross ton at five cents per kilowatt-hour (stated to be a high estimate), the comparison excluding labor costs, showed a saving of from $5.00 to $10.00 a ton in favor of the electric furnace; taking labor costs into account the actual saving was stated to be between $7.00 and $13.00 per ton of ingots. Another point in favor of the electric furnace was the regularity of the composition of the steel and of the time in which the charge was ready, this latter (in the case of a 150-kilowatt furnace at Niagara Falls) approximating about one-and-three-quarters hours under normal conditions of working. In one particular case a heat of over 1,000 pounds of 1.2-per-cent carbon steel was charged and poured in just under one-and-one-half hours, the power consumption being only 440 kilowatt-hours per ton. It was stated that "with suitable arrangements for handling the product, there is no reason why carbon tool steel should not be regularly produced with a consumption of under 600 kilowatt-hours per ton." A few English developments were next briefly related, after which some experiments in nickel melting at Niagara Falls, using a sixty-kilowatt furnace, were given in some detail. With a ninety-per-cent power-factor this small furnace gave a rate of 325 kilowatt-hours per ton for melting only. An English experience in brass melting was then related. Trouble due to the "pinch effect" was overcome in this case by using a special crucible, together with a specially constructed coil on the furnace. By this arrangement the crucible is first heated; then, when the crucible is sufficiently hot, the brass scrap is charged. When the brass melts, thereby completing a circuit, the switch is thrown over, so that the metal itself carries most of the current, and the crucible, when exposed, becomes gradually and visibly cooler. After the first melt, 112 pounds of brass were charged and melted in about thirty minutes, with a power supply of about thirty kilowatts. Twice the quantity of brass required only fifty kilowatts and melted in the same time. The first heating of the crucible required forty-two kilowatt-hours and took one-and-one-half hours. The brass produced was remarkably sound and of excellent quality. Experiments in brass melting with a three-phase firebrick-lined furnace showed a power consumption of about 185 kilowatt-hours per gross ton. The pinch effect was stated to be far less intense with three-phase current than with single-phase current. The second half of the paper dealt with tests (shown in tabular form) of the combination induction furnace of the Rochling-Rodenhauser type, which is used for melting and refining. Early experiments soon showed that this type of furnace "had entered the field as a refiner, and is now in the first rank, accomplishing work which skeptics regarded as impossible." An estimate from tests with a two-ton three-phase furnace for producing tool steel from molten basic Bessemer iron gave a cost of only $5.25 per ton of ingots above the price of basic Bessemer ingots. "This," says the author, "ought to appeal to tool-steel manufacturers, especially as all grades of steel are produced, for the writer witnessed the production of all tempers of carbon steel, high-speed, high-silicon, nickel-chrome, tungsten, and other steels in this furnace." For an eight-ton furnace the cost worked out to $4.05 per ton, but in this case the author showed that $1.30 should be deducted for preventable waste, making the cost $2.75 per ton. "In any case," he says, "the figures given for a high-class steel are very good." Estimated costs of operation of a sixteen-ton furnace, working on basic Bessemer steel, and refining to 0.03 to 0.035 per cent of sulphur and phosphorus and 0.5 to 0.8 per cent of carbon, concluded the paper. These are here summarized as follows: Materials charged (including basic Bessemer metal, burnt lime, ferro-silicon, ferro-silicon, ferro-manganese, fluospar, roll scale, and crushed carbon), $15.10 per gross ton; power (heating, refining and cooling), $0.535 per ton; wages,—on furnace, $0.115, on lining, $0.011, lining materials, $0.054, repairs, $0.190. The total cost, omitting license, tools, amortization and interest, thus amounted to $16.105 per gross ton of 2,240 pounds.

In the discussion, L. H. Baekeland emphasized the fact that the electrochemical industries often require cheap coal as well as cheap power, another point in favor of Pittsburg.

DUCTILE TUNGSTEN AND MOLYBDENUM.

C. G. Fink next described some of the properties of "Ductile Tungsten and Molybdenum."

Tungsten is now the most desirable substance for lamp filaments, but is ordinarily very brittle. The filaments are subjected to a temperature which would vaporize any impurities, and are chemically pure. All sources of the metal heretofore tried have supplied a brittle form which is unable to take a set, but lately it has been obtained in ductile condition. It has been drawn down to sizes smaller than 0.001 inch, and has a much greater tensile strength in the smaller sizes, as was shown by tables of average values. This wire which had a breaking strength of 460,000 pounds per square inch when five mils in diameter, had a strength of 580,000 pounds per square inch when drawn down to 1.2 mils. Similar results were found for molybdenum. The specific gravity of tungsten, which was 18.81 before drawing, was increased to 20.19 by drawing to a diameter of 0.0015 inch. Under like circumstances, molybdenum increased from 10.02 to 10.32. Copper and zinc also show this increase. The specific resistance of tungsten is decreased from 6.2 to 5.0 microhms per cubic centimeter by annealing and the change in molybdenum is from 5.6 to 4.8. The temperature-coefficient of resistance between zero and 170 degrees is 0.005 for both metals. Chemically, the ductile forms behave like the ordinary forms of the metals.

Owing to the patent situation, Mr. Fink was unable to answer the questions brought up in the discussion. Owing to the fact that the ductile tungsten becomes crystalline when maintained at a high temperature it is as yet questionable whether the life of the tungsten lamp will be lengthened by the use of this material.

TREATING OF COBALT-NICKEL ORES.

A new process for the "Treating of Cobalt-Nickel Ores rich in Silver and Arsenic by combined Melting and Electrolytic Operations," was the title of a paper by C. C. Cito, presented in abstract by Mr. Colby, who gave the details of the separations involved and exhibited specimens.

A NEW RADIATION PYROMETER.

The new feature of the pyrometer exhibited and described by C. E. Foster, is the use of a concave mirror to concentrate the radiation upon a thermo-couple. This couple and the main aperture of the instrument are at the two conjugate foci of the mirror, and any object whose angular size is sufficient to cover the aperture will have its temperature correctly recorded. To obtain this condition, the object should not be distant from the instrument more than ten times its own diameter. The accuracy claimed is two per cent in the working range of the instrument.

On Friday evening an informal dinner was held at the Fort Pitt Hotel, to which ladies were invited, and the gentler sex was in evidence in considerable numbers. The tables were prettily decorated and music by an orchestra and a male quartette helped to make the event enjoyable.

C. F. Scott acted as toastmaster and called upon many of the members and guests for informal responses. Section Q was strongly in evidence and helped to make things lively. When the orchestra played "God Save the King" the assemblage arose to its feet, and when near the close of the meeting, Secretary Richards announced the death of Edward VII those present again arose and stood in silence as a tribute of respect for the departed king.

The meeting on Saturday morning was held at the Engineering Building of the University of Pittsburg, where Chancellor McCormick delivered an address of welcome and Professor Frost invited the visiting members of the society to inspect the laboratories.

THE DRY CELL.

The first paper read was by D. L. Ordway on "Evolution and Present Status of the Dry Cell."

Special attention was given to methods of testing cells, and a table of results was given showing that the short-circuit test was not a reliable index of the value of the cell or of its service capacity (in ampere-hours). Tests were made by discharging the cells through a constant resistance, the value of which was different in different tests. It was found that the greatest watt-

hours of discharge were obtained on the highest resistance; that is, at a low rate of discharge. The form of the discharge curve was shown for different conditions of rapid and slow discharge. The curve for a rapid discharge dropped much more rapidly than would be expected from a comparison of the times of discharge. As intermittent service is usually the practical condition, comparative curves were shown for three different kinds of discharge: (*a*) continuous discharge; (*b*) discharge of five minutes per hour; (*c*) discharge of five minutes per hour for eight hours per day. In the early stages the voltage curve for (*b*) was higher than for (*a*), but the curves crossed at a later period and the crossing occurs sooner the higher the resistance in the discharge circuit. Curve (*c*) was lower than curve (*b*), showing very plainly that with intermittent service better results are obtained by a more regular discharge than by an irregular one. In selecting a battery it is better to increase the number of cells in parallel for heavier service, but on light service it is a positive disadvantage to have too many cells in parallel. The temperature of the test is a very important feature, and results should be compared only when the temperatures are the same. The principal uses of the dry cell are in telephone service and ignition service. The tests used by the manufacturers and users in these two cases were described. The practice of one telephone company is to use three cells on a circuit of twelve to sixteen ohms resistance, discharging for four minutes at a time for six days of the week with twenty-minute intervals between discharges. The open-circuit electromotive-force is read before closing the circuit and again after opening the circuit. One manufacturer of these cells uses three cells in series in a twenty-ohm circuit and closes the circuit for two minutes per hour. The electromotive-force is read just before closing. A quicker test can be made on a five-ohm circuit, but the results are not so satisfactory. For ignition service a circuit consisting of vibrator and primary coil of half an ohm resistance, taking four amperes, is considered. The average conditions of use are to have four to six cells in series. The test of one manufacturer consists in connecting six cells through sixteen ohms for one hour in the morning and one hour in the evening; twice a week the cells are short-circuited through one-half ohm, and the current read. When the current decreases to four amperes the test is discontinued and the number of hours of discharge is taken as a measure of the value of the cell.

SEPARATION OF OIL FROM CONDENSER WATER.

The next paper, entitled "The Separation of Oil from Condenser Water by Electrolysis," by H. M. Goodwin, was, in the absence of the author, abstracted by Professor Walker.

The oil particles were found to be of a diameter 0.006 to 0.00066 centimetres and negatively charged. With platinum electrodes the oil is only partially demulsified, while with iron electrodes the demulsification is complete. Mechanical agitation is also effective. It was found that the oil was trapped by the precipitate. The chief agent in doing this is basic ferric carbonate. Ferric hydroxide was shown to play no part.

A paper on "An Electrolytic Method for the Reduction of Cassiterite," by W. O. Snelling, showed that by using hydrochloric acid as electrolyte and zinc as electrode a much cheaper method for the extraction of tin might replace the present process of smelting.

CONDUCTIVITY AND ELECTROLYSIS OF CUPROUS-CHLORIDE SOLUTIONS.

Results were given in this paper of a preliminary investigation which had for its object a study of the refining of copper in a cuprous-chloride solution. The only advantage that could be expected in refining copper from a cuprous-chloride solution is that 96,600 coulombs of electricity would deposit 63.6 grams of copper, assuming 100 per cent efficiency, in place of half this quantity, which is obtained in the acid-copper-sulphate solution universally employed in copper refining. If the resistance of the cuprous solution were the same as the sulphate solution, it is evident that only half the power now consumed for refining copper would be required. In 1904 the maximum available energy in the ten electrolytic refineries in the United States was 12,700 horsepower, which since then has doubtless been considerably increased. At $20.00 a horsepower-year the cost of the power used in 1904 in the United States to refine copper would be $254,000. If the refining could be done with a chloride solution of the same conductivity as the sulphate solution, there would have been a saving of $127,000. This possibility seemed, therefore, a question worthy of some consideration. The authors' own summary of and conclusions from their investigation are as follows: (1) It was shown that the conductivity of cuprous-chloride solution can be made as high as that of the solutions ordinarily used in copper refining by the addition of hydrochloric acid. (2) At room temperature a current efficiency of ninety per cent of the theoretical can be obtained when the solutions are acidified. The presence of free acid is therefore beneficial in every respect.

A paper by James Breckenridge on "Electrochemical Potentials of Calcium-Aluminum Alloys," was abstracted by Professor Burgess. The electrical properties of these alloys were shown by curves to indicate a critical composition for the alloy containing about forty per cent of aluminum.

ELECTRODEPOSITION OF LEAD FROM PERCHLORATE BATHS.

A paper was read by C. F. Mathers on "Electrodeposition of Lead from Perchlorate Baths."

This paper showed the possibility of lead-plating by the use of a solution of lead perchlorate containing free perchloric acid, if an organic addition substance is added to the electrolyte. Peptone was found the most suitable substance for this purpose. Cathode deposits may be obtained over one inch in thickness, very smooth, and of a specific gravity of 11.36. It is necessary that chlorides and barium salts be absent. A bath that has been giving good deposits will form very bad "trees" if a quantity of hydrochloric acid or some barium perchlorate be added to it. The properties of lead perchlorate which are of special value in a plating or refining solution are: Great solubility; cathode deposits which are smooth, dense and free from "trees"; approximately theoretical corrosion of the anode and deposition upon the cathode; absolute stability under all conditions to which it is subjected in a plating or refining bath; no polarization from the formation of lead peroxide on the anode; very high electrical conductivity. The bath should contain about five per cent of lead, two to five per cent of free perchloric acid, and 0.05 per cent of peptone. A current density of from two to three amperes per square decimetre (eighteen to twenty-seven amperes per square foot) may be used. The peptone is gradually used up, and after about four days a quantity equal to the original amount should be added. The free acid is slowly neutralized by chemical solution of the lead and must be replaced. The bath gives excellent purification, the cathode being about 99.98 per cent pure. The author also referred to the bath used by Betts, which is a lead fluosilicate containing free fluosilicic acid and some gelatine or glue.

In the discussion it was stated that in Germany a lead borofluoride is used, with peptone or gelatine as addition substance.

WHITING ELECTROLYTIC CELL.

The Whiting electrolytic cell was next described by its inventor, Jasper Whiting.

This cell uses mercury and sodium chloride with a graphite electrode for producing caustic soda and bleaching liquor. The sodium is first formed as an amalgam with the mercury and in a second operation is oxidized. Ninety to ninety-five per cent efficiency is claimed under the working conditions of four volts and current density of 100 amperes per square foot. The chlorine obtained is ninety-eight per cent pure. From 350 to 375 pounds of mercury are required for each cell, of which about six per cent is lost in the course of a year. The cathode liquid of caustic soda can be run up to a concentration of forty per cent or higher. The construction of the cell was illustrated by very complete drawings giving sectional views.

TOWNSEND CELL.

The last paper of the session was one by H. K. Richardson and R. L. Patterson on the Townsend cell.

This cell performs the same functions as the Whiting cell just described. The experiments, which were made with various current densities from eighteen up to 500 amperes per square foot, showed that with increasing current densities the efficiency and the output per kilowatt-hour dropped, especially rapidly at first.

In the discussion Mr. Hooker pointed out that the figures given, while qualitatively correct, do not apply to practical working conditions, on account of the dimensions of the cell used, and the figures obtained in practice are much more favorable than those given by the authors.

The following papers were read by title only and will be published in full in the transactions:

"A new Method for the Electrolytic Winning and Refining of Metals," by E. M. Chance.

"The Electrolytic Reduction of Nitric Acid," by H. E. Patten and W. J. McCaughey.

"The Effect of Moisture and of Solutions upon the Electrical Conductivity of Soils," by R. E. O. Davis.

"A Rotating Graphite Anode," by J. W. Turrentine.

"Comparison of Rapid Electrochemical Methods—The Determination of

Copper," by F. C. Frary and A. B. Peterson.

"The Electrolytic Deposition of Platinum," by W. J. McCaughey and H. E. Patten.

At the close of this session a vote of thanks to the University of Pittsburg, the management of the Fort Pitt Hotel, the local committee, the various establishments which had opened their doors for visits by the members, and the clubs which had invited the visitors to enjoy their hospitality, was unanimously passed.

In the afternoon a general public meeting was held in the Carnegie Music Hall. This meeting was opened by C. F. Scott.

The first address was by the secretary of the society, Prof. J. W. Richards, on "The Present Status of the Electrochemical Industries." Professor Richards sketched briefly and in a popular way some of the most important developments in the application of electrochemistry to manufacturing industries and showed a large number of lantern slides illustrating the various uses to which electrochemistry was being applied. Professor Richards was followed by John H. Finney, secretary of the Southern Appalachian Conservation Commission. Mr. Finney's topic was "The Conservation and Utilization of Natural Sources of Power," special attention being given to the use of coal and water power. Dr. John A. Brashear gave an address on the advantages of Pittsburg as an electrochemical center. The purpose of this meeting was to give the people of Pittsburg some idea of the rapid and immense developments of electrochemical industries and to indicate to them what a prominent part Pittsburg might take and would be forced to take to maintain her present supremacy as an industrial center.

## Commission News From New York.

The New York Public Service Commission, Second District, has granted the application of the Islip Electric Light Company to exercise franchises granted by the villages of Islip and East Islip, Suffolk county. The company proposes to manufacture and distribute electric light for street and commercial lighting. The application was opposed by the Suffolk Gas and Electric Company, which is now serving gas in the villages in question. This company supplies electricity to the village of Bay Shore and parts of the town of Islip but has not furnished electric light to Islip and East Islip. The Commission in granting the application holds that in territory into which an electric light company seeks to enter not actually occupied by another company permission to begin such construction ought not to be denied because another company located in and already serving an adjoining territory claims that it is able, ready and willing to serve the territory sought to be entered. Where the objecting company is not actually supplying the territory to be served it cannot claim that such territory "belongs" to it. The commission points out that as a business proposition it would be more economical for the communities sought to serve to make terms with neighboring and existing companies. It does not consider that it is its function to do more than refer to such a course.

The commission has approved the declaration of abandonment by the Port Jervis Traction Company of that part of its railway in Port Jervis known as the Kingston Avenue branch and authorized the company to extend its line from Port Jervis to Sparrowbush.

On the question of abandonment the commission says that the railway property now owned by the traction company has not been successfully operated either actually or financially during its entire history, that the Kingston Avenue branch has not yielded returns above operating expenses, that to restore the branch to proper operating conditions would involve the expenditure of approximately $14,000.

The commission is also of the opinion that the street railway in Port Jervis must continue to be operated with small patronage, and it is essential to the furnishing of satisfactory accommodation and good service to the public that the traction company be enabled in all reasonable ways to secure a sufficient amount of gross revenue.

J. F. Turk, president of the Hornell-Bath Interurban Railway Company, appeared before the commission in behalf of the application of that company for authority to issue $248,000 in bonds, which are to be sold at not less than eighty-five. Present conditions in the bond market were explained by L. L. Tweedy of Spencer Trask & Company, whom the attorney placed on the stand to show the marketable features of public service corporation bonds. Decision of the commission was withheld.

## Advanced Electrical Studies at Massachusetts Institute of Technology.

Some interesting facts are being brought out by investigations of the effect of high voltages on insulating material by H. S. Osborne, who is carrying out work for the degree of Doctor of Engineering at the Massachusetts Institute of Technology. At a recent meeting of the Boston Section of the American Institute of Electrical Engineers, which was held at the electrical engineering laboratories of the Institute of Technology, Mr. Osborne lectured on the results of his experimental research. He briefly presented the results in an interesting and effective manner and set forth theories of the effect of high voltage on insulating materials which are in closer harmony with experimental facts than the theories which have usually been stated.

The lectures of Prof. Harold Pender for graduate students will next year extend the discussion contained in his advanced lectures of this year on the high-voltage alternating transmission and utilization of power. The general treatment of the transmission circuit contained in his lectures of this year will be repeated and extended and more attention will be given to the conditions arising from the utilization of the power.

Professor Jackson's lectures for graduate students on the organization and administration of public-service companies have this year dealt more particularly with questions of value of plant, the theory of so-called intangible values, the relation of revenues to value of the plant, depreciation, and the like; and next year the lectures will be directed more to the theory underlying the methods of charging for service by public service companies, with particular reference to charges for electric light and power, but with collateral consideration of railroad and tramway charges and charges for gas and the service of other public utilities.

Professor Wickenden will originate a course of lectures on illumination, photometry and illuminating engineering which will become a part of the optional curriculum for undergraduate and graduate students.

# Electrical Notes From Great Britain.

By Our British Correspondent.

By the time these lines appear in print the annual meetings of the Iron and Steel Institute will have been concluded in London. There are a number of papers of electrical interest, including the following: Prof. W. Borchers on the Girod furnace and the electric smelting works of the Paul Girod system; Donald F. Campbell on progress of electro-smelting; D. Selby Bigge on developments in the production of electric power; its application and bearing upon the iron and steel industries. Among many others of less direct electrical bearing is one on the economy and design of modern reversing rolling-mill steam engines by E. G. Sehmer and Rudolf Drawe. The Duke of Devonshire is the new president of the Institute.

A convention of tramway managers is being held in Ireland in the same month, and, as usual, in June there will be the annual convention of the Incorporated Municipal Electrical Association. This is one of the principal events of the summer season every year, when engineers and municipal committeemen interested in municipal electric light and power undertakings meet to discuss what are regarded as the uppermost technical and commercial questions of the time, and to fraternize. The president being W. Lackie, the city electrical engineer of Glasgow, that city will be the rendezvous, with a day at Edinburgh fitted in. The subjects announced for the meeting, which opens on June 14 with Mr. Lackie's presidential address, are: "Commercial Progress," by A. C. Cramb and H. C. Bishop; "Mixed-Pressure Turbines," by A. Bremner; "Exhaust-Steam Turbines," by F. A. Newington, city electrical engineer of Edinburgh; "Chemistry in the Boiler House." by A. R. Sillar; "Advantages of Continuous Records of Costs and of Steam Consumption"; "Cheapening of the Costs of Mains and Services."

The joint meeting of the American Society of Mechanical Engineers and the British Institution of Mechanical Engineers, to be held at Birmingham and London in July, also possesses interest for electrical men in view of the promised presence of George Westinghouse who is expected to interest the gathering with the question of railroad electrification. J. A. F. Aspinall, the president of the English Institution is also a leading authority on that subject, being one of the few eminent railroad experts here who have had practical experience with electrified lines (Lancashire & Yorkshire).

The other important engineering gathering of the summer months is the annual week of the British Association for the Advancement of Science, which opens at Sheffield on August 31.

A number of our electrical manufacturing firms are occupied with exhibition matters just now. From what one can gather, they appear to have taken greater definite interest in the Buenos Aires Exhibition opening in May, with the desire to embrace a favorable opportunity for making a more effective electrical trade connection in this particular market. A few have seemingly preferred to expend their exhibition energies nearer home and are displaying at the International Show at Brussels where by the cooperation of the British Government Exhibitions Commission favorable facilities have been procured. Some others are arranging exhibits at the Japan-British Exhibition which is now getting into order at Shepherd's Bush, where the Franco-British event of two years ago was held.

A demonstration showing the relationship between the sent and received currents in telephone lines under the various conditions which occur in practice, occupied the attention of the London Physical Society at a recent meeting when B. S. Cohen described experiments (*a*) showing the relationship between the received and sent current for various lengths of standard cable unloaded, (*b*) illustrating the variation in the current sent when the receiving end was open or closed circuited and the length of the cable was varied, (*c*), showing the current distribution along the loaded cable by inserting a barreter at different points along the cable. Mr. Cohen said it was now possible to make both calculations and quantitative telephonic tests which gave mutual confirmation. Dr. A. Russell in the course of the discussion congratulated the author on his admirable demonstration of the effects of loading a telephone cable with Pupin coils, and said that much of the success of the demonstration was due to the barreters and the vibrating wire generator which Mr. Cohen had himself perfected. It was well known that the effect of the loading coils was to improve both the volume of the sound and the clearness of the articulation. Dr. Russell suggested that the higher efficiency of the loaded cable might be partly due to the diminution in the value of the current and the consequent increase in the value of the potential at the sending end, the gain in efficiency due to this cause being due simply to the smaller expenditure of energy in heating the wires.

Interest is being directed to the numerous villages and small towns of England for which electric lighting has not hitherto been considered a commercial proposition. These places generally speaking are served with high-priced gas often of poor quality, and the prospects of effective competition from electric lighting have been greatly improved by the metallic-filament lamp. A new company has just come before the investor which proposes to handle half a dozen small installations of this class without troubling to secure powers from Parliament or the Board of Trade. It will act entirely upon agreements with the municipal authorities and wherever at all permissible and practicable it will economize capital outlay by using overhead instead of underground distribution. The six installations to be put down in the first instance will cost from $5,500 to $10,000 each (average $7,500), and each will be capable of supplying 2,000 to 3,000 lamps. A minimum output of 24,000 units per annum per station, selling at sixteen cents per unit, is reckoned on in the promoters' estimates. There is undoubtedly a big field everywhere at present unexploited, for electrically serving the smaller townships and villages, and we are sure to see a great deal of attention de-

voted to the question during the next few years.

The writer has already referred in these pages to the unhappy position in which some tramway authorities of the United Kingdom stand. The London United Company has issued a statement which, while it affords extremely cold comfort for the shareholder, bears evidence of a real attempt to put the house in order. Years ago when everything was new and had not lost the early glamor which covered most electrical undertakings, profits were too generously divided instead of proper provision being made for renewals. Then came the time when the ordinary dividend fell and at last disappeared; then the preference dividend was reduced also and this year that has disappeared entirely, for this present report says that what would have been divided for preference-share interest will have to be devoted, as will also the reserves, to repairs and renewals of track and rolling stock, etc. It is quite true that we have not known very long the rate at which tramway wear and tear would take place, but this company would have done well had it paid heed to the warnings that were offered when fairly reliable data had been accumulated and when its own system produced internal evidence. However, as an attempt is at last to be made to set things right, there is hope that gradually the company may rise again in public favor.

The city electrical engineer of Glasgow, W. W. Lackie, has been looking into the future and finds that the existing generating stations will not long be equal to the demand for light and power. The Port Dundas and St. Andrews Cross stations, of which the writer gave a full description in these pages a year or two ago, are already full of machinery. Their maximum safe load is 23,600 kilowatts, and during the winter just ended the actual maximum was 21,650 kilowatts. Before the days of the metal-filament lamp the demand was growing at the rate of 3,000 kilowatts per annum. It is true, says Mr. Lackie, that at Port Dundas there are some small sets which might be scrapped, larger ones taking their places, but this could only be a temporary expedient, and would not solve the problem of an increased supply for the next five or ten years. He therefore advocates the erection of a further generating station in order to meet the winter load of 1911 or 1912. A site with a frontage to the Clyde and adjacent to the Caledonian Railway has been selected. Other municipalities are moving ahead again with extensions to their electric generating plants. St. Helens is extending to supply works and collieries of the town and district with high-tension current and is adding a 1,000-kilowatt turbo-alternator. Warrington is adding a set of similar capacity, rotary converter, etc. Manchester is spending $150,000 on substation plant. Norwich is going to add exhaust-steam turbine plant, etc., to the tune of just under $90,000.

What may be found to form the nucleus of a commercial organization for electricity supply development men has just been started by members of the staff of the Marylebone Borough Council's electricity department. There is a good deal of the spirit of commercial enterprise in the members of this department and it has brought them into a storm of controversy with some who disapprove of their particular brand of aggressiveness. Their present step in forming an Electric Sales Society, which will afford those interested in pushing the sale of electricity and winning the consumer over, an opportunity for meeting and discussing special points in regard to their particular calling, will hardly call forth objection from the critics. It appears to the writer to meet a real want in England and should be heartily supported.

The pursuit of economy by electricity supply companies has taken a fresh spurt and is being followed by some who for various reasons have previously neglected it. A case of the kind would seem to exist in the Liverpool District Lighting Company which as the business gradually developed added small engine-driven sets one by one until they now number seven. Some of them are more than ten years old and compared to modern practice are "steam-eaters." It is now proposed to install one large set which will take about half the steam now required for the entire station, so that the saving in fuel, etc., will be sufficient to enable 100,000 more units to be produced per annum on the old expenditure. This little company is also adopting up-to-date measures for seeking new business, having opened a showroom and inquiry office, engaged canvassers, and made arrangements for special heating and cooking demonstrations by a qualified person.

Several electric supply authorities are laying themselves out to cater more actively for electric heating business. Southampton, acting under the advice of the city electrical engineer, has issued revised charges under which for heating and cooking a flat rate of one cent a kilowatt-hour, without any meter rent, is to be charged. The City of London Electric Lighting Company reports that heating supplies have increased at a greater rate than in any previous year. The Brompton & Kensington Company is offering a combined tariff for heating as well as lighting, avoiding for the consumer the cost of a separate wiring system or a separate meter. The supply is offered for lighting, heating, cooking and motive power purposes on a tariff basis which, without increasing the cost of lighting, gives the additional energy required for all purposes at four cents and beyond a certain quantity at two cents. The chairman of this company when expounding this system to his shareholders doubtless saw in them prospective consumers, for he adopted the role of the publicity man when he spoke thusly: "In course of time when this new system is carried to its proper conclusion in conjunction with the installation of central water-heating, the kitchener with its coal cellar and dust bin will be superseded, and cooking will be done by turning on a switch. When that good time comes, there will be no fires to lay or grates to clean up, cooking utensils will not be soiled by smoke, and as all dust will be removed by electrical vacuum cleaners, the expense and hardship of domestic service will be materially reduced."

Users of ten-year-old plant such as we have mentioned above should find the experience of others interesting reading just now. The City of London Company, for example, gives the following figures to illustrate what large economies it has effected during a decade:

| | Units sold. | Coal consumed. |
|---|---|---|
| 1899 ..... | 8,500,000 | 57,000 tons |
| 1909 ..... | 26,318,000 | 46,700 tons |

That is when burning 11,000 tons of coal less, three times the quantity of energy is turned out.

ALBERT H. BRIDGE.

London, April 30, 1910.

# CENTRAL-STATION PRACTICE

## Transmission—Interior Wiring.

## ELECTRIC POWER PLANT IN A MODERN APARTMENT HOUSE.

BY D. H. BRAYMER.

The Apthorpe Apartments are located in one of the most popular residential districts of New York city, between Seventy-eighth and Seventy-ninth streets, occupying the block facing Broadway on the east, and West End Avenue on the west. The structure is twelve stories high, not including the basement, and of the most modern fireproof construction throughout. The architecture is of a very pleasing design, the exterior being of limestone trimmed with granite.

There are in all 104 apartments, having from six to ten rooms each, equipped with nearly every known convenience for promoting physical comfort in a home of a few rooms.

In the modern apartment building, even more than in any other, the comfort of the tenants depends to a large extent upon the engineer and the power plants in his charge. It has therefore become of utmost importance and of the first consideration that the building be laid out and equipped as completely as possible. That this equipment in the Apthorpe has been carefully planned, is borne out by the success with which it operates. It does not require a careful investigation of the equipment to see that it is among the most complete which is installed in the modern apartment houses of New York city.

The power station is housed in the basement and consists of a generating equipment, heating apparatus, ventilating apparatus, water-supply equipment and refrigerating plant.

### ELECTRICAL EQUIPMENT.

Excepting the steam pumps in the boiler room and the pumps connected with the refrigerating plant, all the power throughout the building is electric. It was therefore necessary to provide a larger generating capacity with a careful provision for accidents and emergencies.

Three units are installed, each consisting of an Allis-Chalmers horizontal tandem-compound Corliss engine, direct-connected to a Hawthorn three-wire generator of Western Electric manufacture. From the generating units current is taken to the switchboard and from there distributed to the motor, lighting and other circuits.

In connection with the generating equipment, there is a storage-battery equipment consisting of two sets of Chloride batteries of sixty-six cells each. This arrangement gives 240 volts with the two sets connected in series, with a current capacity of 800 amperes. This battery serves for load regulation, between 5 a. m. and 11 p. m., of fluctuations of elevator service, and carries the small lighting load of the building from 12 o'clock midnight until early morning. Besides this, the capacity is sufficient to carry the day load also for a sufficient time to make any repairs to the engines or boilers. A booster set consisting of a thirty-five-horse-power Hawthorn motor direct-connected to two 26.6-kilowatt generators is run in conjunction with this storage battery. Fig. 3 shows the arrangement with a small motor-generator as exciter at the left. During the day one of the three-main generators supplies the electrical energy for the entire building; motors are connected on the outside wires at a voltage of 240, while incandescent lamps operated at 120 volts are connected between the neutral and the outside wires.

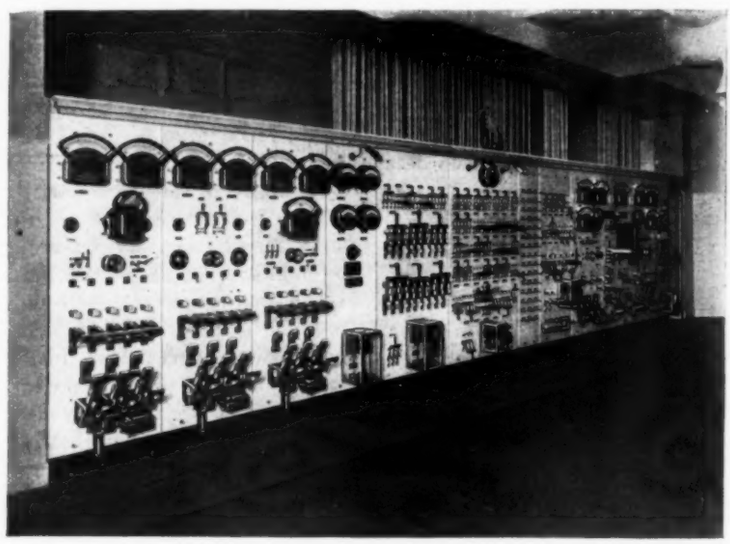


FIG. 1.—THE MAIN SWITCHBOARD, APTHORPE APARTMENTS, NEW YORK CITY.

### GENERATORS.

The Hawthorn three-wire generators manufactured by the Western Electric Company are in general design and appearance but slightly different from the Standard Hawthorn generators of "L" design, manufactured by the same concern. The most distinct feature in the design of these machines is a doubly wound armature which is employed for obtaining the neutral electromotive-force point. Use is made of a special balancing winding which is placed beneath the usual armature winding at the bottom of the slots. This winding is interconnected with the main armature winding and with a slip ring in such a way that the slip ring always possesses a potential midway between

the potentials of the two brushes. The section of the copper in the auxiliary winding is large, so that the current density is low, thereby enabling the machine to take care of very large unbalanced loads. The voltage regulation is close even under sudden or large changes in the unbalanced loads.

In order to compound for the total load on the generator under all conditions, the series field winding is divided into two parts, one-half of the coils being connected to one terminal, the coils on alternating poles being connected to the same side of the armature. The liability of the insulation breaking down is reduced to a minimum since the coils having the full potential of the machine between them are not placed on the same pole. This arrangement further results in perfectly balanced magnetic and electric circuits. The neutral wire is connected to the brushes, which rest on the collector rings, electrically insulated from, but mounted at the end of, the commutator. This simple construction is possible because no shifting of the neutral brushes is required, no matter what amount of overload is carried.

All these generators are of the same rated capacity, namely, 125 kilowatts. The load range carried by them is such that one unit is sufficient for the light day load and two for the maximum evening load, so that one unit is always kept in reserve.

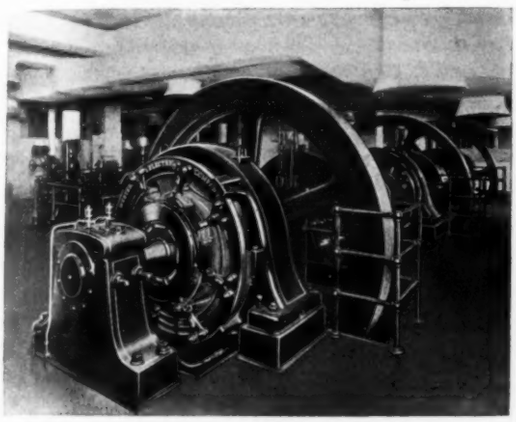


FIG. 2.—THE ENGINE ROOM.

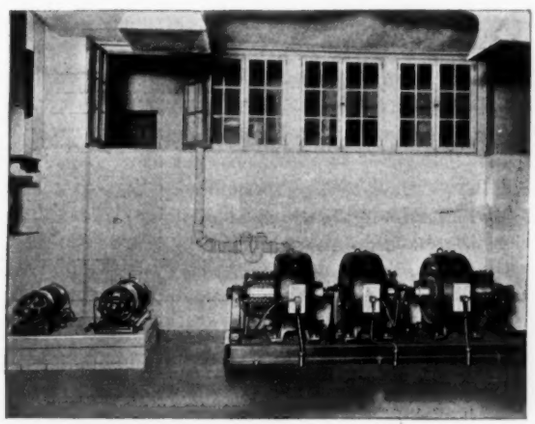


FIG. 3.—BOOSTER AND EXCITER SETS.

### ENGINE ROOM.

A view of the engine room showing the three generators and the three driving engines is seen in Fig. 2. This room is approximately square and has about 2,500 square feet of floor space. The generators are equally spaced along the south end of the room, with the beds of the tandem compounds extending out north and south into the room. Current from the generating unit is led through ducts in the floor to the switchboard which is located on the west side of the engine room and at the left of the engines in Fig. 2. This board was furnished by the Western Electric Company, and, as shown in Fig. 1 consists of twelve panels. It is thirty-five feet long and eight feet six inches high, divided (beginning at the left as seen in Fig. 1) into three distributing panels, and five panels which are used to care for the storage-battery equipment. The board is equipped with Weston indicating and recording instruments of the latest improved types, as well as circuit breakers and other protecting devices. As seen in the illustration, the board is raised from the floor and sets out from the wall so as to be more accessible for changes in wiring, etc. Back of this power board is a small board consisting of one panel, which is used in connection with the bell and annunciator circuits. The energy for operating these bells is furnished by two means, one being held as a reserve. For ordinary operation a small motor-generator set is used, shown in Fig. 3 at the left, while for accident or emergency a set of storage cells is available.

### BOILER PLANT.

The boiler plant, located in the basement and facing Broadway, is equipped with four Babcock and Wilcox water-tube boilers of 200 horsepower each. They are of the inclined-tube type, having a combined heating surface of 8,232 square feet, and 176 square feet of grate surface. The boilers are arranged in two rows so as to be conveniently fired from a common aisle, which is about eighteen feet wide.

The system of boiler feed includes three duplex feed pumps and two injectors, a feed-water filter and two feed-water heaters. Two feed pumps are required to supply the boilers when running at full load, so that one of the pumps is held in reserve. The pumps take their suction from a muffled tank to which are connected the condensation returns and clean drop lines from the refrigerating plant. The pumps draw their water through the filter and deliver it to either one of the two feed-water heaters.

The three-inch feed mains to the boilers are in duplicate, cross-connected between the pumps, feed-water heaters and two injectors provided for emergency.

The boiler room is below the level of the sewer system, and in order to lift the drainage water and sewerage from that part of the building to the sewer level, a compressed-air system is installed which works in connection with what is known as the Shone sewer lift. Each of two ten-horsepower motors drive an eight by nine Clayton air compressor which furnishes air to the system. The air is stored in a pressure tank, which by the automatic action of the compressors and motors, keeps the pressure constant. When the pressure drops to a certain point the circuit is closed by an automatic device.

The cold-water supply for the apartments is filtered and stored in four large tanks located on the roof. For delivering the water to these tanks, one electrically driven and two steam-driven pumps are provided. Under or-

dinary conditions the steam pumps are used, the electrically driven pump being held for emergency and for times when it is necessary to shut down the boilers. In these cases, the motor is supplied with energy by the storage battery. Both systems of pumps have independent regulating devices and operate automatically, keeping the water in the tanks always at the same level. Fig. 4 shows the twenty-five-horsepower Hawthorn motor, chain-connected to a Deane two-cylinder pump. The steam pumps are also shown directly back. These pumps are located in the basement west of the boiler room on the Seventy-ninth street side.

MOTORS.

The principle motor load consists of elevators and ventilating fans. There are eight elevators, four passenger and four service elevators. One of each is at the four main entrances from the corners of the court which opens to the street on Broadway and West End Avenue. The elevators are well arranged for emergency service, being so placed that if the unexpected should happen and one temporarily disabled, the other can be used for both services. Otis elevators of the drum type are used in all cases.

The fans are located in the boiler room and are three in number. Each is a six-foot Sturtevant Company fan, driven by a twenty-horsepower Hawthorn motor. One of these fans blows cold air into the boiler room, another exhausts it. The third fan exhausts the air from the engine room, which is located directly above the boiler room and under the court. The fan used in connection with the engine room takes its air through a system of ducts which extend along the ceiling of the engine room. The main duct branches into three separate ducts, each extending over one of the generating sets and having eight openings. Through these the heated air enters and is exhausted into a chimney flue which delivers it to the atmosphere. With the scheme in the boiler room the temperature is kept moderately low and comfortable to work in. Electric power is used in connection with a gravity oiling system which furnishes oil to the engines and other machines. A small pump, chain-connected to a one-half-horsepower motor, takes the oil after being used and filtered, and lifts it to a tank above the engine room level where it is again available for use by gravity circulation. A small motor also drives a centrifugal pump which supplies the two fountains in the court with water. The motor load amounts to about 470 horsepower, 300 horsepower in elevator motors and the remaining 170 in other motors used for service about the plant.

HEATING SYSTEM.

The heating system in this building is quite complete and neatly arranged. An exhaust-steam system is used and the radiators are concealed under the window sill and covered with wainscoating. They are inclosed in a galvanized iron box so that the cold air enters at the bottom and is heated as it passes upward through this box and the register at the top. This method precludes any draft of cold air in the room. Automatic regulation of the temperature of each living room in the apartments is provided by use of Johnston thermostats in connection with the radiators.

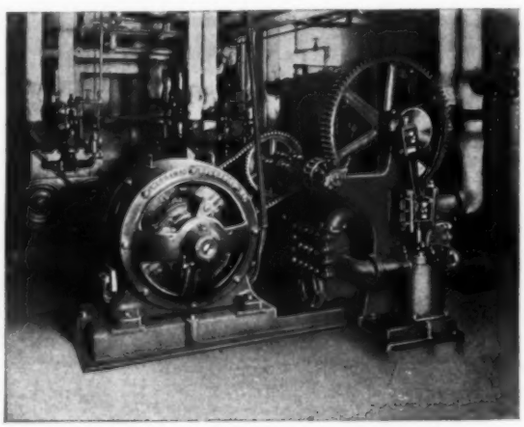


FIG. 4.—MOTOR-DRIVEN PUMP.

Steam is supplied to the radiators from supply risers distributed about the building, which are fed by a ring main from the exhaust header in the boiler room around the basement. The ring main is supplied by two connections to the exhaust system, and is also provided for a live-steam connection at the boiler room steam main. The Cyrer system of circulation is used in connection with two pumps.

REFRIGERATING SYSTEM.

The absorption type of refrigerating system is used in this plant and consists of two twenty-five-ton Carbondale ice machines with steam-driven ammonia and brine pumps and a small motor-driven brine-mixing pump. In the refrigerators are coils through which the brine is forced so that whenever ice is needed, all that is required is to set a vessel containing water on the coil. In case this is not desirable, small cakes of ice may be obtained from the engineer in sizes about six by eight by four inches. These cakes of ice are made by filling cans of the above sizes with water and placing them on a brine coil, provided for this purpose in connection with the refrigerating plants. The compartments held a number of cans and it is always kept filled by simply filling the can from which the ice is taken with water. An ever ready ice supply is therefore on hand at all times.

LIGHTING SYSTEM.

The lighting equipment of this building is most complete and fixtures are varied according to the tastes and service required by the tenants. In the decoration great variety is displayed and a number of popular periods are represented. The lighting features over the dining tables especially those in keeping with the French period, are magnificently massive. In all, there are about 10,000 lamps in use, some being tungsten and others incandescent of varying candlepower.

For the apartment floors, the system of feeding in connection with the wiring is unique and especially well adapted to the purpose. From the main switchboard in the engine room, five large feeders or mains lead to five different points on the basement floors. At each of these points there is installed a sub-switchboard, on which are mounted switches controlling the feeders to the various distributing centers on the upper floors.

The telephone equipment of the Apthorpe consists of a 135-line prime branch board which interconnects the several apartments as well as the stores and offices on the Broadway side. In all there are 120 lines which receive connection to the Bell system through the Riverside exchange by means of this board. The entire electrical equipment, including the wiring, etc., with the exception of the storage battery and a few small motors, was furnished by the Western Electric Company.

## THE EVOLUTION OF THE SWITCHBOARD: TWENTY YEARS' PROGRESS.[1]—I.

BY SAUL LAVINE.[2]

Many leading men in the profession today are those who, in the early eighties, operated the electrical apparatus then in use and first recognized the economy, safety and reliability that were to be obtained by the proper control of electrical energy.

At that time electrical knowledge was limited to a few individuals; the general public having little information as to matters electrical. It could not, therefore, be reasonably expected that the full advantages to be derived from a properly equipped switchboard would be appreciated.

The illustrations given herewith emphasize the situation better than it can otherwise be expressed. The switchboard of this early period has been aptly termed "the afterthought." It was the day of the small unit; there were no large electrical installations, and the switchboards, such as they were, had but one virtue—they did not cost much. They originated in necessity and there was no such thing as design.

The generator and exciter were first installed. The station operator then found it necessary to use certain switches for opening and closing the circuits, and in some cases regarded it desirable to have instruments to indicate the voltage and amount of current being distributed. This was a much mooted question, however, on account of the extraordinary readings which would be procured by placing his instruments where they could be conveniently used. Instruments and meters were considered generally unreliable, and consequently unnecessary, inasmuch as the operator could never tell how they were going to operate until he had installed them among his wires and busses and observed their operation.

For the sake of convenience all switches and instruments were placed on the side walls of the building, and put as close together as their dimensions would permit. The wires from the generators and feeders were then brought to the switches and instruments, and as additions were made, the number of wires soon became so great as to interfere with proper operation of the switches.

[1] Abstract of a paper read before the Pittsburg Electric Boosters' Club, Pittsburg, Pa., March 28.

[2] Engineer, Pittsburg Office of the General Electric Company.

### THE EARLY SKELETON SWITCHBOARD.

The next step in switchboard evolution occurred when the operator found it necessary to move his switches and instruments away from the wall a sufficient distance to make room for the wires leading to them. This was accomplished by the use of a plank or board to which these switches were attached; thus originated the name "switchboard." For a time the style of switchboards resembled that of a solid board fence, and necessitated a drilling of holes through the boards every time a connection had to be made. This inconvenience brought forth the switch rack, or lattice work, on which the switches or instruments were mounted, allowing open spaces through which the wires could be brought. This switch rack and framework constituted a skeleton switchboard; some of these are still to be found in operation.

When additional generators and feeders were put in service, the operator would necessarily take a foot rule, measure the base of his switch, find a bare spot on his switch rack, and then fasten the switch upou it. After placing the switch, he would draw the wires over, under, and among the other wires behind the rack until they reached the point for connection.

Little thought was given to safety or protection. The largest units operated did not exceed fifty kilowatts in capacity, and the highest voltage used was not above 2,500 volts. The oil switch was unheard of. Some station operators were even skilled in the use of a contrivance consisting of a wooden handle in which was firmly fixed a stout leather strap or flap about six inches wide, and eighteen inches long. In opening a feeder switch, the operator would take this strap in hand, and at a single blow extinguish the arc, which was pulled in opening a circuit.

### THE ORNAMENTAL SWITCHBOARD.

Following the period of "afterthought" switchboards, came the period of "ornamental" switchboards, many of which were more ornamental than useful.

The character of the circuits and the units involved had not reached a point where switchboards became a very serious engineering question. Whenever a new alternating current generator was installed, a new exciter accompanied it, and no provision was made for paralleling either generators or exciters. The architect found the switchboard the most likely object for artistic effort and consideration. The question of most economic operation and flexible control of energy was not given serious thought.

During this period switchboards were built of the rarer and more expensive woods, and occasionally of marble or marbleized slate. They were often set like a picture in a deep frame of metal, or wood, or surrounded by large and ornamental scroll work, with massive clocks as center pieces. These clocks, by the way, were seldom wound, and emphasized more than ever the fact that switchboards were more ornate than useful during this period.

In those days individual units and small stations were subjected to the most severe fluctuations of load conditions. Their operator was necessarily very inefficient, and their meter and instrument indication very unreliable.

During the nineties the switchboard art had developed so far that the Thomson-Houston Company—now the General Electric Company—offered "panel units" for sale. This marked the beginning of the switchboard panel industry, and at this time slate panels first appeared. Switchboards were wired on the unit system, and some effort was made to provide for extensions.

*(To be continued.)*

### Philadelphia Rapid Transit to Borrow.

It has been announced by the Philadelphia Rapid Transit Company that at a special meeting of the stockholders to be held on June 20 the latter will be asked to confer authority upon the management to borrow $5,000,000. If the loan is authorized by the shareholders only half of that amount will be borrowed at this time and the other $2,500,000 whenever the contingency arises.

### Annual Convention of the Pennsylvania Engineers.

The second annual convention of Pennsylvania engineers will be held in Harrisburg, Pa., June 1 to 4 under the auspices of the Engineers Society of Pennsylvania.

The programme includes a number of lectures, visits to local plants and a number of entertainment features. There will also be conducted an industrial exhibit similar to the one last year.

ELECTRIC LIGHTING and ILLUMINATING ENGINEERING

## THE DISTRIBUTION OF ARTIFICIAL LIGHT.[1]—II.

BY FRANK MARSHALL SCANTLEBURY.

Distribution and control of light by opaque reflectors are accomplished entirely by their science in design and lamp position so that in order to fully control the light given from a lamp it is absolutely necessary to cover at least three-fourths of it with a reflector. This is due to the fact that the greatest light is given off at the horizontal and it is essential that this be controlled. We will take for example a condition existing where there are two looms placed

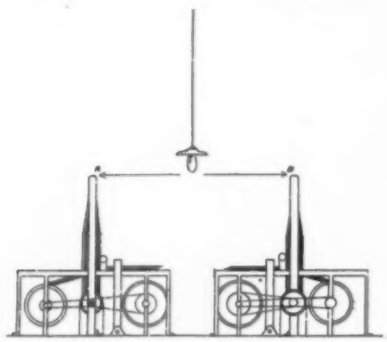


FIG. 3.—OLD METHOD OF ILLUMINATING LOOMS.

facing each other as shown in Fig. 3 used for the purpose of weaving narrow cotton cloth. The manner used at the present time to illuminate these two looms is to hang a carbon lamp about six and one-half feet from the floor directly between them and to place above the lamp a flat tin reflector. This has the power of redirecting three candlepower into the horizontal and illuminating brightly the upper part of the loom, or in other words, that part of the machine that is directly in line with the horizontal light.

In Fig. 4 we have a steel cone reflector hung in exactly the same position and we find that the light is thrown strongly down on the shuttle and on the harness, the two most important parts of the loom.

However, if a stronger downward light is required this may be accomplished by the aid of a concentrating

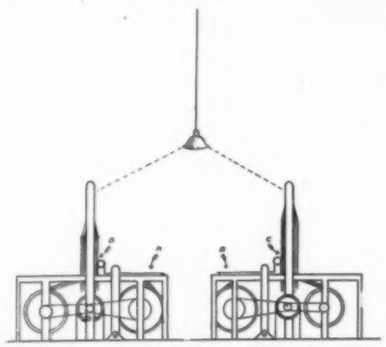


FIG. 4.—LIGHT PLACED WHERE NECESSARY BY PROPER CONTROL OF ILLUMINATION.

type of a steel reflector shown in Fig. 5 used individually over separate machines without any additional current being required, using, instead of sixteen-candlepower lamps eight-candlepower lamps, which will give a light beneath equal to that given by the

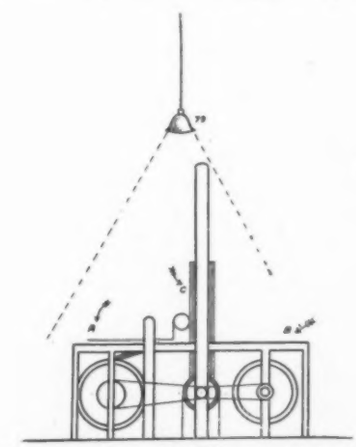


FIG. 5.—LOOMS LIGHTED INDUSTRIALLY BY SEPARATE REFLECTIONS.

common tin cone shade and sixteen-candlepower lamp.

By using the Mazda or tungsten lamps in conjunction with the new bowl-type steel reflector, we get an exceptionally fine light. A reflector known as the S-E-60 will give us at points *A* and *B* when used with a sixty-watt tungsten lamp sixty-six candlepower, while at points *C* we have thirty-five candlepower. In Fig. 6 we have an example illustrating two spinning frames lighted by an S-E-60 and a sixty-watt lamp. By experiment we have found that we can use this same combination to illuminate four cotton looms.

There is an S-I type of the same bowl reflector that will give us sixty-eight candlepower from a sixty-watt lamp directly beneath. This reflector

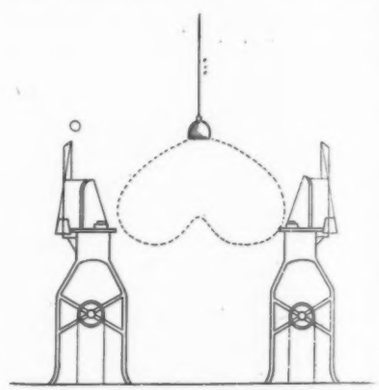


FIG. 6.—METHOD OF ILLUMINATING TWO SPINNING FRAMES.

used over sorting tables and inspection tables is found to be a particularly good type. Figs. 7 and 8 give us the distribution curve of both these type reflectors.

There are numerous requirements for general illumination and where the units are well up out of reach of operators, glass reflectors of an extensive type which are broad in distribution and yet allow no waste at the horizontal are used to good advantage.

The use of arc lamps has proved in so many cases to be such a poor solution to the problem of general illumination in textile mills that their use is not encouraged. They give what is known as spot lighting in addition to flickers and mechanical troubles, and the aim in all general illumination is

[1] Abstract of a paper read before the National Association of Cotton Manufacturers, Boston, Mass., April 28.

to produce an even and steady distribution of light. Large units in the Mazda and tungsten types are also inadvisable unless they are used plentifully or high above the floor, as they produce the same effect as arcs and render sections of the room absolutely dark, should they give out at any time. The scheme of laying the units out of squares is found to be the most satisfactory way of solving the general illumination problem in textile mills, and this plan is advised wherever that style of lighting is desired.

It is usually advisable in cases of

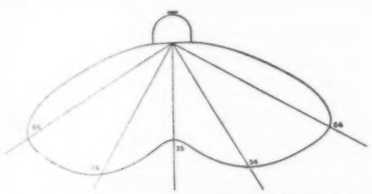


FIG. 7.—DISTRIBUTION CURVE OF S. E. 60 REFLECTOR WITH SIXTY-WATT TUNGSTEN.

general illumination to call in the services of one who is experienced in this line of work. The services of an illuminating engineer can always be secured gratis from any of the big concerns who are specialists in the lighting field.

The best manner of illumination in textile mills has proven to be individual or group lighting from a large number of distributed small units, and it is for this reason that it has been dwelt upon more than on other schemes. Mill men

FIG. 8.—DISTRIBUTION CURVE OF S. I. 60 REFLECTOR WITH SIXTY-WATT TUNGSTEN.

are realizing more and more every day the vast importance of satisfactory artificial illumination and it is a safe estimate that the best lighted mills in the world are found in the United States. However, there still remains plenty of room for improvement, although the strides made in this field within the last few years have been surprisingly great, but, within the next year we will see developments that heretofore were undreamed of.

### Mercury-Vapor Lamp.

In a mercury-vapor lamp recently patented in the United States a very simple means has been adopted for starting the arc between the electrodes.

The tube containing the mercury

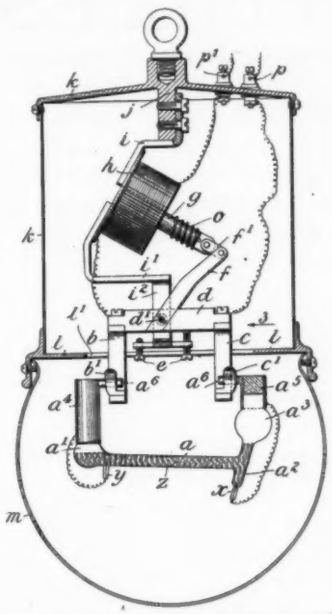


FIG. 1.—MERCURY-VAPOR LAMP IN STARTING POSITION.

(shown at $z$ in the accompanying illustration) is suspended from a pivoted hanger which is moved by the solenoid core $g$.

Before current is applied at the terminals $p'$ and $p$, the tube is horizontal

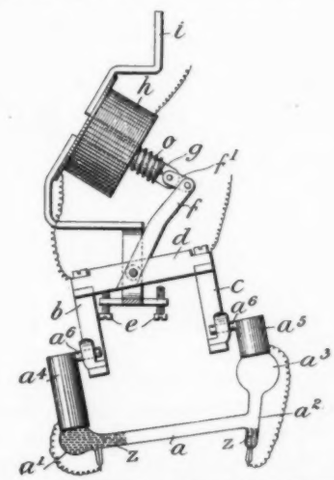


FIG. 2.—MERCURY-VAPOR LAMP IN OPERATING POSITION.

and there is a mercury connection between the electrode $y$ and $x$. As soon as current is turned on, the solenoid $h$ is energized, pulling in the core $g$ and thereby tilting the vapor tube so that the column of mercury is broken.

If for any reason the arc is interrupted or the current stopped, the tube resumes the horizontal position making a metallic connection between the electrodes. Fig. 2 shows the mechanism of the lamp, and the position of the tube when current is flowing. The two screws $e$, shown in the diagram, are used for the purpose of adjusting both positions of the tube.

### Free Electric Sign to Boost Macon, Ga.

The following letter has been addressed by the Central Georgia Power Company to the mayor and council of the city of Macon, Ga.:

"In a spirit of co-operation with you toward the realization of a bigger, better and busier Macon, we hereby offer to furnish to the city, free of all charge, for a period of five years from the starting up of our hydroelectric development on the Ocmulgee River, sufficient electric current to provide illumination for a sign bearing an inscription in keeping with the city's best interests.

"Our ideas, and the conditions under which we refer to donate this electric current to the city, are as follows:

"That the inscription therefor would be left to the citizens of Macon for determination through a ballot to be taken by the newspapers of the city, or otherwise, under the direction and supervision of a committee containing, among others, a representative of the city council, the chamber of commerce and this company.

"That a sign appropriate for the purpose and composed throughout of steel will be constructed by the city and erected on the highest point in the city of Macon, or elsewhere in the city upon suitable steel towers, so that same would be visible to all visitors to Macon from all railroads and other traffic channels.

"That the sign in question would contain not more than 1,000 four-candlepower tungsten sign lamps and that the city would furnish and maintain the structure, transforming equipment, lamps, etc.

"That said sign would be lighted from dusk to midnight daily, except in cases where, because of excess demands on our power plant or otherwise, we would not have any power to spare, a condition which we would not seriously anticipate, but we would, nevertheless, reserve the right to utilize the service for our regular customers in such a contingency.

"That in the event of the site selected being removed from one or another of our various distribution circuits in Macon, the city would bear the cost of reaching same from our nearest distribution circuit.

"As our large hydroelectric development is now nearing completion, the city will not have any time to spare in order to complete arrangements for the construction and installation of a suitable sign before the day on which we will turn on current in our Macon substation, and on the evening of which day, if at all, we should like to see illuminated the sign for which we hereby offer to donate the requisite electric current."

The above letter is but another of the many cases showing the public-spiritedness of public-service corporations, even though the power company will without doubt be an ultimate gainer by any plan to make a "bigger, better and busier Macon."

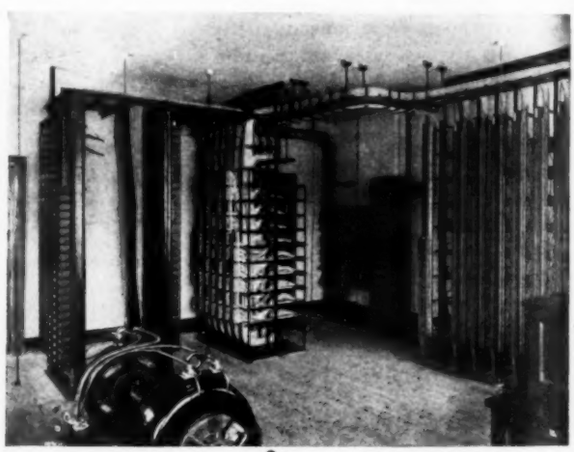
# TELEPHONY—TELEGRAPHY, and WIRELESS.

### The Monmouth Telephone Plant.

At Monmouth, in the western part of Illinois, a new central agency exchange equipment has recently been put into service in the new building provided for the consolidation of two telephone companies. The new switchboard of the Monmouth Telephone Company has an ultimate capacity of 4,500 lines. Especial facilities have been provided for rural lines, which are handled through the medium of the self-restoring combined jacks and signals.

The entire telephone system of Monmouth was converted from magneto to common battery at the same time the "cut-over" was made. One hundred telephones a day were tackled by the installation force, so as not to make the work of conversion cripple the city's service. With its new facilities the exchange is one of the best appointed in the state.

OPERATING ROOM, MONMOUTH TELEPHONE EXCHANGE.



TERMINAL ROOM, MONMOUTH TELEPHONE EXCHANGE

Monmouth's new board is a Western Electric Number One. It accommodates nine operators, and has facilities for operating thirty toll lines directly for night service. All apparatus in this switchboard is mounted on a rigid iron frame, the woodwork merely forming a covering and arranged so as to make the apparatus readily accessible for inspection and adjustment.

The line circuit in this board employs a double-wound clickless line relay and a cut-off relay supported on a common mounting. When a subscriber who desires a connection removes his receiver, current flows out through the double-wound line relay, the operation of which lights the line lamp.

The rural line circuits with which this board is equipped are terminated with the combined jacks and signals of the self-restoring type. When the signal is in its normal unoperative position it presents a dead black surface to the operator. When it is thrown by a subscriber calling, a red surface is displayed, which turns again to black when the operator inserts her plug in answering the call.

In the rural position of this board "combination" cord circuits are installed. They are arranged so that connections may be made between rural and common battery subscribers, or between rural and rural or toll lines, irrespective of the characteristics of the lines so connected. These cord circuits automatically adapt themselves to any condition which may arise.

A Monson Maine slate fuse panel has been installed with this equipment to provide for fusing all circuits. These fuses are of the indicator alarm type. When a fuse is blown a pilot relay is operated, which in turn lights a pilot lamp. This relay closes a circuit through a loud-ringing bell, thereby giving an audible signal. Each fuse is equipped with a glass bead, which forms a visual signal to facilitate in locating a blown fuse.

The subscribers' bells will be rung by means of the so-called harmonic system, which employs four-frequency currents, one frequency being used for each of four parties on one line. By this means any one party on a line may be signaled from the switchboard without disturbing other parties on the same line.

With this switchboard has been installed a chief operator's desk, which contains trunks to the subscribers' switchboard, wire chief's desk and manager's desk, and is provided with monitoring circuits and service observation lines for properly supervising the work of the operators and determining the character of service given by each. These lines provide for making connection to a subscriber's line upon which complaint has been made, so that it may be determined whether the subscriber or the operator is at fault.

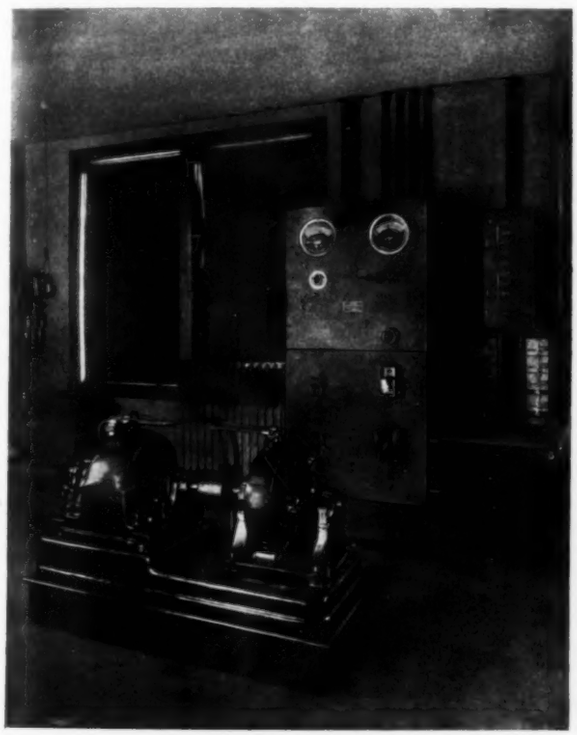
The wire chief's desk installed with

this equipment has a capacity for ten testing trunks to the switchboard as well as testing circuits to the toll desk and test lines to the main distributing frame. This desk is of the cordless type and is arranged to give maximum efficiency in locating and remedying trouble in the inside circuits as well as on the outside lines.

A complete power plant has been installed to supply energy for operating this exchange. A set of storage batteries has been provided with ample reserve capacity to carry the exchange load in case of fire or other cause crippling the city power system.

The motor-generator set installed in the Monmouth office consists of a single-phase self-starting motor direct-connected to a noiseless charging generator of special construction. In case of accident to the storage battery ordinarily used for supplying energy to the switchboard, the charging generator may be used to supply energy direct. With this arrangement of a storage battery and a noiseless charging generator it is practically impossible to cripple this telephone system.

A modern toll board has been installed with this equipment. The toll circuits are terminated on this board by combined jacks and signals.



POWER PLANT, MONMOUTH TELEPHONE EXCHANGE.

### Telephones and the Post Office in England.

In one important respect the future of the telephone in Great Britain is already definitely settled, says the London (Eng.) *Financial Times*. After 1911 the service will be wholly in the hands of the state. This arrangement has put an end to some of the controversies connected with telephone administration, but it has also given rise to problems which are, perhaps, of greater practical interest to the business world. When the agreement for the sale of the National Telephone Company's undertaking to the Post Office was made we expressed the fear that its terms would limit the expenditure of capital by the company during the concluding years of its tenure. Events have fully justified that fear. It is generally agreed that the wide scope for telephone development demands an increase in the rate of capital expenditure; according to one of the soundest of telephone experts there is room for the profitable employment of several millions a year for some years to come. But the actual sums expended on capital account by the National Telephone Company for each half-year since the beginning of 1906 are as follows: £608,408 (about $29,630,000), £521,263, £583,758, £545,752 £496,584, £361,079, £313,394, and £255,361. That is to say, the annual increase in capital expenditure has been practically halved. The Post Office expenditure on telephones during the same period has also shown a decrease, the figures for the last three official years, ended March 31, being £1,293,185, £1,106,140 and £1,217,120. From these figures it is quite clear that the intrusion of the Post Office has resulted in a partial starving of the telephone service. From time to time vague statements were made by Sydney Buxton (British Postmaster-General) about the means he proposed to adopt to enable the National Telephone Company to spend capital freely during its final years without prejudice to the shareholders, but nothing of an effective kind appears to have been accomplished. This is one of the problems confronting Herbert Samuel, and we hope he will not be long at St. Martin's-le-Grand without discovering some way of maintaining the proper rate of growth in telephone facilities.

But that problem is a minor one compared with that confronting the Postmaster-General when the transfer of the telephone takes place. There are two great difficulties to be met—the difficulty of obtaining sufficient capital year by year and the difficulty of keeping the service at the highest pitch of efficiency in the fact of constant demands for lower rates to subscriber and higher wages to the staff. It is much to be regretted that chambers of commerce—supported, as our news columns recently showed, by the Association of Municipal Corporations—should confine their agitation in telephone matters almost exclusively to the question of rates. If they were to make a close study of the telephone situation here and in countries where the service is more highly developed, they would see that the difference does not lie at the door of lower rates, but is due to a liberal expenditure of capital (attracted by good dividends) and to unceasing attention to efficiency in every detail of organization. Contrary to the general view, the telephone service is not simply a matter of providing so many instruments and so many exchanges and arranging a cheap schedule of rates. It is a very highly specialized business, demanding keen intelligence and intimate knowledge, constant supervision of minute but

vitally important details of traffic, and the highest incentives of carefulness and devotion on the part of every member of the staff. All kinds of business demand these qualifications, but none in a greater degree than the telephone service.

The high stage of telephone development reached in the United States —where, for instance, trunk lines are used with an ease and freedom which are a revelation to anyone accustomed to the dilatory and inefficient system in Great Britain—is due to the fact that under private enterprise, unharassed by state interference, the telephone companies have been able to develop their organizations to the highest pitch. There is grave doubt whether a similar pitch is possible under (British) Post Office rule, with officials who tend inevitably to become hide-bound, with capital restricted by treasury and political requirements, with a system of promotion by seniority instead of by merit, and with the same sort of labor agitation as is growing year by year in the telegraph and postal services. One has also to reckon with the fact that the growth of the telephone has been affecting the revenue from telegrams, and that, consequently, the Post-Office authorities will not be inclined to force the telephone service forward at the rate it deserves. That there will be a definite change in the state of affairs is clearly recognized within the National Telephone Company's own staff.

The *National Telephone Journal* recently remarked: "In America, on the one hand, the telephone service is rapidly being developed to its utmost limits; in Europe, on the other hand, state-controlled, the telephone system is either, at best, moderately developed, or else absolutely starved. There is no doubt that in a well-organized company the freer stimulus given to individual merit and capacity, and the reaction of the latter both on the quality and earning power of a service, benefit a far wider circle than the shareholders—namely, the public at large. Compared with the simple question of rates, the possibility of a falling-away from the high standard of efficiency now reached by the National Telephone Company is a profoundly serious matter." After all, it does not matter very much to a business man whether the telephone service costs him £10 ($48.70) or £15 ($73.05) a year if the facilities afforded are in every way adequate. The effect of an increasing agitation for lower rates, and only for lower rates, must tend to discourage the outlay of capital, to delay the reorganization of out-of-date equipment, and to provide an excuse for starving the special technical departments on whose work the value of the service to the public depends to a far larger extent than most people are aware. The entire energies of chambers of commerce and other bodies representing business men ought to be concentrated on securing the highest rate of progress and the highest limit of administrative efficiency under Post-Office rule. All their energies will be needed for that work; but if these energies are to be limited merely to adjusting the schedule of rates, it will be found by experience that the cheapness of a telephone service is no guarantee that it will be worth even the reduced amounts asked for it. We feel sure that if these bodies were to arrange for a detailed study of telephone conditions at home and abroad by capable men they would realize their influence is really needed to secure the adequacy and efficiency, much more than the superficial cheapness, of the telephone service under Post-Office management.

### Telephone Train Dispatching on the Great Northern.

The Great Northern Railway, which at the present time is using the telephone to dispatch its trains on divisions covering approximately 2,100 miles of its line, is now planning on a further extension of this system.

Orders have recently been placed for telephone train dispatching apparatus to be installed on six more divisions, viz.: Fergus Falls, Breckenridge, Northern, Dakota, Saint Cloud and Cascade divisions, covering a total of approximately 1,900 miles. As these divisions are among the most important and busiest of the whole railway—thirteen dispatchers being required to handle the large amount of traffic—it can easily be seen that this method of train dispatching has taken a firm hold upon the Great Northern Railway officials.

The apparatus to be installed will be the Cummings-Wray selectors and Western Electric telephones, as this style of equipment has been adopted as standard by this railway, and is now in use on the present circuits. Two hundred and ninety stations will be completely equipped for the new class of service.

An interesting feature of this installation will be the placing of telephones at sidings and at stations which are not open during the whole twenty-four hours, 350 telephones being required. While the train crews in this way can reach the dispatcher at any time, the important fact is that the dispatcher can get in touch with the train crews waiting at any siding.

When the proposed equipment has been installed, the telephone train dispatching systems of the Great Northern Railway will extend over the entire main line from Minneapolis and Superior to Seattle and Vancouver, and, it is believed, will cover the longest continuous stretch of track of any railroad in this country.

### Summer Courses for Engineers.

The tenth annual session of the Summer Schools for Engineers and Artisans, under direction of the College of Engineering of the University of Wisconsin, at Madison, Wis., opens June 27, continuing for six weeks.

Advanced courses are offered in direct and alternating currents, hydraulics, machine design, descriptive geometry, applied mechanics, shopwork, steam and gas engineering and surveying. Elementary courses for artisans, and those not having preparation for the advanced work, are offered in applied electricity, engines and boilers, fuels and lubricants, mechanical drawing, machine design, materials of construction, shopwork and surveying.

The teaching staff is taken from the regular instructional force, and all laboratory equipment of the engineering college is available for students. Requests for bulletins or further information should be addressed to F. E. Turneaure, Dean, College of Engineering, Madison, Wisconsin.

### Depew Wireless Bills.

The Senate Commerce Committee has reported the Depew bill regulating wireless telegraphy, reserves to the Government certain wave lengths by which means the transmission of important Government or distress messages may be protected.

# ELECTRICAL Advertising *and* Selling

## WHY SOME ADVERTISING FAILS.[1]

BY CHARLES A. PARKER.

To those who know it by experience, the query, "what is failure?" may seem like nothing less than an exceptionally refined bit of cruelty. Nevertheless there are certain mistaken notions about it still prevalent enough to justify our ascertaining exactly what we do mean when we speak of advertising as "failing."

Just as darkness is the absence of light, just so is failure the absence of success. Success, in its turn, consists in securing a financial return from advertising large enough to repay the original appropriation and, in addition, to secure a percentage of business in proportion to the money expended. It is this fact that justifies the oft-repeated statement that "good advertising is not an expense, but an investment."

Success, as we define it here, is the ultimate result of all good advertising. It may be either direct or indirect—a circumstance which sometimes deludes advertisers into believing that there are forms of advertising from which a financial return is not to be expected.

In reality, however, there must eventually be such a return if it comes only by the most round-about route. When it does, it is indirect. Take, for instance, advertising, the main object of which is to develop a spirit of good feeling and friendship for the central station.

Advertising that creates a demand by reference, suggestion or by making the prospect familiar with the name of the article advertised is to be considered as belonging to this class, as is also advertising that is supposed to offset competition or to maintain the central station on an established footing.

In all these cases, although a direct connection cannot be established between the advertising itself and financial returns, the connection must be there just the same or the advertising is a failure. In other words, there is no such thing as advertising for its own sake or for any other purpose than increasing the central station's revenue.

It is an unfortunate fact, however, that simply because no connection is seen, this sort of advertising is often regarded by central-station advertisers as failing when, as a matter of fact, it is either successful or fails for some entirely extraneous reason.

By far the larger part of advertising, however, seeks a direct result, "a financial return large enough to repay the original appropriation and to secure a percentage of business in proportion to the money expended." When this sort of advertising fails, it is quite unnecessary to call in experts to ascertain the fact, although they may be handy when it comes to holding a post-mortem to ascertain the cause.

### WHY DOES ADVERTISING FAIL?

In endeavoring to learn what the fundamental weaknesses are that have the most to do with the failure of advertising, we shall probably find it convenient to divide our discussion into two parts. First, a discussion of defects that characterize faulty advertising in general. Second, a discussion of the weakness of the individual advertisement.

As a general proposition, when central-station advertising fails, it is because of the absence of one or more of the following qualities: Persistence, a co-operative spirit, good judgment, quality. Probably the first copy-book ever published promulgated the fundamental principle of successful advertising. "If at first, etc." Trite as it it, it's the right idea. Drops of water, one at a time, will wear away the hardest rock.

True as this may be, there are still times when results can justly be expected from a single advertisement. When you have a brand new proposition or an old proposition with brand new and attractive features and combine with it a strong, striking piece of advertising, you are certain to get results.

This, however, is the exceptional case and, with the progress of central-station advertising, is becoming rarer and rarer so that, in ninety-nine cases out of a hundred, the central station will be called upon to adopt the policy of patient and persistent advertising.

Good advertising is cumulative in effect. A person sees one advertisement and possibly only gives it a passing glance. A second advertisement may gain but little attention. A third, however, is most certain to receive attention as something that one has heard of or seen before. Sooner or later, succeeding advertisements are going to corner the reader and compel consideration if he is at all susceptible to the appeal that is being made. Repetition in this case is adding a constantly increasing force and vigor to the advertising, increasing the pulling power of each advertisement.

There is still another reason for this untiring persistence that the writer regards as so all-important. Nothing short of a book, or series of books, could tell the whole story of electricity. One or two advertisements will not do it. The best that can be expected is that each advertisement will pick out some vital point and emphasize it.

Now it so happens that the inducements which lead one person to take a certain course of action will have no influence over another. So, if you intend to hit every possibility in his weak spot, you will have to use a number of advertisements before you accomplish your purpose, and advertise persistently.

Advertising is not a medicine to be taken for various ills that reduce the corpulency of the corporate purse. It is, or should be, a food so nutritious as to keep the receipts constantly increasing in vigor and size. Of course, there are times when patience seems to cease to be a virtue, but that is no reason for stopping your advertising. When a man's food disagrees with him, he does not stop eating. He finds out what

[1] The seventh of the present series of articles on "Central Station Advertising" appearing in the second issue of each month.

is the matter and changes his diet. Just so with advertising that fails to produce results after being a fair trial. Find out what the matter is and change your style of advertising. But see that it does have a fair trial.

It is detrimental to keep jumping from one form of advertising to another. Assuming now that we have established the necessity of persistence as an element of successful central-station advertising, let us proceed to that element we have described as "a co-operative spirit."

THE NECESSITY OF CO-OPERATION.

Advertising, to a large extent, plays the part of vanguard to the central-station's "new-business" army. It is, in effect, abandoned when the sales force either through lack of sympathy or lack of knowledge of what is going on does not work in harmony with it.

An advertising campaign loses a large, perhaps the largest part, of its force if it proceed along one line while the solicitors are working along entirely different lines. The two forces should co-operate.

The advertising matter should act, to a very large extent, as forerunner of the solicitor. It should create no impression that he is forced to explain away. No more should the solicitor do anything to weaken any favorable impression that the advertising might have created.

But the necessity of a co-operative spirit extends farther than the sales forces. It should animate every department and every employee connected with the institution.

Your advertising seeks to create a friendly feeling among customers and prospects for the company. If when people enter your offices, on the invitation perhaps of some advertisement, they are greeted in an indifferent or surly manner, how much good do you suppose the advertisement which brought them there has had?

After all, the company is going to stand or fall on its own merits. Advertising may start business the way of the central station, but unless the central station receives it right and treats it right, it will not be long before the best advertising ever produced will be ineffective.

"Team work" is as essential to the central station that is ambitious to make the most of its advertising as it is to manager of a ball team.

The forces get together and work together, and every member of every department should be imbued with the spirit of optimism and enthusiasm as it is breathed forth by the advertising.

Unless this is the case, advertising will tend to become not much more than part of the routine work—practically emasculated as far as any real effective business producing powers are concerned.

QUALITY.

As a cause of failure, the next element we have to consider is probably as prolific a source of disappointed hopes as any. The lack of what we term "quality" generally proceeds either from a well-intentioned but ill-timed desire to be economical or from ignorance of what "quality" advertising really is.

It might be well to explain that the writer is speaking more particularly of advertising "matter" now than of newspaper billboard and other forms of publicity and refers to the physical make-up rather than to the copy.

High-grade advertising was never more essential than it is at present. People have been educated to it by the flood of matter from thousands of advertisers—who have learned by experience the value of mail advertising.

What if the housewife doesn't know the difference between Scotch Roman and Cheltenham and doesn't stop to figure out that the illustrations you use are duo-tones?

She does know that the woman in the picture looks cool, and clean and attractive and that the whole atmosphere of the advertisement is one of comfort.

Central-station advertising matter must indeed be good. It is mistaken economy to compel your printer to cut his price to a point where he must use the shoddiest of papers and eliminate everything from the composition and press work but speed.

Of course there is also the possibility of overdoing things. It is very easy to make advertising so expensive that—no matter how many returns come in—it could not pay for itself. But there is far less danger of erring in this direction than there is in the other.

This, however, must be taken into consideration. Putting more money into advertising is not equivalent to improving its quality. One man can do more with five hundred dollars than another would do with five thousand. So that, after all, it resolves itself into a question of the advertiser's ability to get the most possible for his money.

There is another place, however, where the ability of the advertising man enters to a greater extent than the one we have just mentioned. And that is in the exercise of good judgment.

GOOD JUDGMENT.

Every other element essential to good advertising may be present; but if good judgment in directing the use of those elements be absent, everything is lacking.

Here is where the most subtle factors enter—factors which are as hard to describe as they are rare of possession, but which make all the difference between failure and success. Good judgment involves hitting at the right time, in the right way and in the right place. This is the psychological factor.

A thorough grounding in the proposition itself is, of course, merely the first part of the whole. To be fully successful, the central-station advertiser must keep his ear to the ground to detect the vibrations of public feeling.

He must have his finger on the public pulse with all the solicitude of a physician awaiting a typhoid crisis.

A little reflection on the matter makes the necessity of this thorough acquaintance with the prospect perfectly clear. When two people make a contract, there is a "meeting of the minds." Just so when an advertisement brings the reader to the point of buying an electric iron, there must be a similar meeting of minds here, that of the advertiser with that of the prospect. At certain times and under certain conditions, the mind of a prospect and, indeed, the minds of a class of prospects are susceptible to influence.

It takes considerable judgment to know just when the psychological moment is, but the experienced advertiser will detect it and, as a result, get the maximum of returns for the minimum of advertising effort and expense.

This receptivity or non-receptivity of prospective customers should also determine, to a very large extent, the character of the advertising. If they are not quite ready to take action a campaign of education must precede one intended to secure actual results whereas, if the public is receptive, all

such preliminary effort would be useless if not positively detrimental.

In concluding this first part of our discussion, the writer would call attention to one fact that it is well to keep constantly in mind. Always remember that your advertising represents the central station. Just as much as a solicitor represents it. And just as you wouldn't keep a slovenly salesman on your force, just so should you be careful that no advertising goes out that will create an unfavorable opinion of the central station and its business.

THE INDIVIDUAL ADVERTISEMENT.

It is very easy to imagine a central station persisting in its advertising, putting it out at the right time and to the right people, spending plenty of money on it and supporting it by the co-operation of every department and individual and still failing to secure the results it should. When that is the case, we must look for defects to the individual advertisement.

We will perhaps find it easier to find the structural weaknesses of individual advertisements that fail by first dissecting an ideal advertisement to learn what it accomplishes.

A good advertisement must first of all catch the eye. There must be something about it that attracts attention—that which, when the prospect first looks at it compels him to halt and give it further consideration. Having done this, it must be so written as to hold the attention and arouse interest of the prospect. The reader must find the promise suggested by the headline or the illustration borne out by the text. Furthermore that interest must not be allowed to wane. It must grow in intensity as the advertisement progresses.

But mere interest is not the only thing we are after. We seek to create a desire for the article advertised. It must be the natural outcome of the interest first developed. And it must eventually be made to culminate in action.

If we look at the advertisement itself to see what the elements are that accomplish these various steps, we will find that, roughly speaking, it is first of all the physical form of the advertisement—the "layout"—that gains attention. The rest if left to the copy of which the greater part must serve to arouse interest and create desire, leaving the "close" to induce action.

The "form" of the advertisement involves two phases, the illustration and the typography. Of these, the illustration, with the headline (or the headline alone in case the advertisement is not illustrated), must act as the eye-catcher. With this in mind, let us ask ourselves what there could be about an illustration that should make it fail to catch the reader's eye sufficiently to induce him to read the advertisement. Such defects we will find are either inherent in the illustration itself or due to faulty arrangement.

COMMONPLACENESS.

The most common defect is, of course, commonplaceness. It is no easy matter to design striking illustrations or compose attention-compelling headlines. And unfortunately for the effectiveness of many an advertisement, the prospect looks upon it as nothing more than the "same old story—nothing but an advertisement."

Eye-catching illustrations and headlines must be original, or rather, let us say "attractive," for the wrong kind of originality is as much of a defect as a virtue.

They must gain an audience for the advertisement either through their forcefulness or because they are pleasing. And to do this they must avoid, as they would poison, thread-bare ideas presented in a thread-bare manner. The illustration and headline must either present an old idea in a new way or must present a new idea altogether. While originality is desirable it is probably the source of the next defect we have to consider, a defect that the writer would term "incomprehensibility."

INCOMPREHENSIBILITY.

People must understand instantly what you are driving at.

They are not going to sit down and figure out the meaning of far-fetched, subtle conceptions. Simplicity and unity should govern the production of any advertising illustration and headline, and should tell its story at a glance and relieve the reader of all necessity of studying it out. Somewhat akin to this "incomprehensibility" are far-fetched comparisons that are altogether too common, for to the intelligent person, at least, they excite ridicule, and the writer doubts their effectiveness in any case.

Far-fetched comparisons suggest that the proposition must have weaknesses somewhat which the advertiser must conceal by piling on a lot of stuff that has no connection with the article at all.

Avoid this sort of advertising. It is decidedly puerile and generally comes from some mistaken notion of cleverness. Inexperienced advertising men are more apt to indulge in this sort of thing than their wise elders. Just as the "wise elders" are apt to err in the other direction ignoring the "human interest" side of advertising.

These defects, of which we have been speaking, are inherent of the illustration itself. Of course, there are many others, such as poor drawing, poor composition, poor reproduction, etc., in discussing which we would gain nothing.

Finally there are defects in arrangement. An illustration may be good in itself, but given so little space that it loses out. Or it may be put in the wrong place, so that it passes over without being noticed. All these are factors that must be considered in planning an illustration or headline that is intended to catch the reader's eye and induce him to consider the advertisement.

TYPOGRAPHY.

There are two facts to bear in mind when we come to consider the typography of an advertisement and it is failure to consider them that makes a weak advertisement in this respect. The first is that good typography aims to make it unnecessary for the reader to exert great mental effort in order to gather the meaning of the text. The second is that good typography desires to please the eye. In other words, the main object in preferring one type face to another should be on the score of legibility. Care must also be exercised that the reader is not confused by a multiplicity of type sizes, bold face expressions, italicized words, etc. This much for "catching the reader's eye."

After attention is secured, your copy must take up the good work and carry it forward to a favorable conclusion.

COPY.

To describe all the forms of copy possible and explain the place for each would go way beyond the limits of this article, even if it were in the writer's power to comprehensively discuss the matter.

We must satisfy ourselves here with this much. Copy must vary in spirit

with the people to whom it is directed. It should be optimistic in all cases, never sarcastic, seldom funny, and should never in any way say or suggest anything offensive to the prospect. To illustrate what we mean by this last, the writer has in mind an advertisement which said in so many words almost, "If you don't get in on this proposition you're an out-of-date old fogy." Such tactics are as bad as they are bold and are probably produced under a mistaken notion of frankness.

The amount of copy that should be put in any given space will probably be a bone of contention as long as advertisements are written. Brevity may be the soul of wit, but advertising is not supposed to be funny. This much, however, may be said. Advertising should be as short as possible. The writer should not attempt to tell the whole story at once. But he should tell enough to be effective. He must govern what he writes by the space at his command, the story he has to tell. At all times he must keep his matter simple. It must be straightforward and so written that the reader is not compelled to hold in mind a long list of subordinate ideas before the main idea is given him. Each statement should be complete in itself. The close of the advertisement is probably the most important of all because it is on this that you must stand or fall.

There are two things to bear in mind in addition to the fact that your strongest appeal must be at the end. One is that you must have a definite proposition to make if you are looking for direct returns. The other is that you must make action easy. These are familiar notions, but they are repeated here because their importance cannot be over emphasized.

### Advertising Electricity.

The Oklahoma Gas and Electric Company, of Oklahoma City, Okla., has published a double-page advertisement in a local paper. The advertisement calls attention to the reliability and convenience of electric power. During the past year the number of this company's customers increased fifty-one per cent.

The Advertising and Selling Company recently purchased the *Trade Journal Advertiser*, which it will combine with its magazine, "*Advertising and Selling.*"

### Effective Advertising in Chicago.

A very unique and effective method of advertising has been adopted by the Commonwealth Edison Company, Chicago, Ill. At various times throughout the past year, the merchants in different business sections of the city have taken it upon themselves to install local ornamental street lighting systems and on the first night their streets were illuminated there have been carnivals held.

On these nights the Commonwealth Edison Company decorated one of its large electric trucks making a very handsome float. On the most recent of these occasions the float shown in the accompanying illustration was entered in the function by the Commonwealth Edison Company.

FLOAT OF THE COMMONWEALTH EDISON COMPANY.

As may be seen the float represented a cottage, on each side of which was a sign to the effect that the company wired houses at cost. A number of young ladies from different departments accompanied the float with horns and megaphones. This made a very inexpensive and effective form of advertising.

### Electric Lights for Fire Wagons.

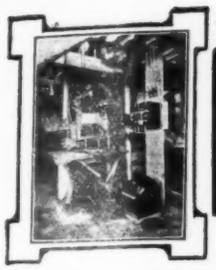
A new application of electric lights has been found at Niagara Falls, N. Y., where they have been installed on the aerial truck of the fire department, and on the fire chief's buggy. The lights serve not only to illuminate the path of the vehicles, but also to supply light to the interior of burning buildings. On arriving at the scene of the fire, lamp cord is attached to the batteries and light may thus be supplied where lanterns could not be carried.

### To Boost Local Industries.

The products of Chicago factories are to replace all other lines of goods in the windows of the retail stores of the city, during one week in August, according to the plans of the Chicago Association of Commerce announced in a recently issued bulletin. The exact date of the exhibit and other details will be decided at a mass meeting to be held soon.

### Civil Service Examinations.

The United States Civil Service Commission announces that on June 1, two examinations will be held, one for wireless engineer, and the other for wireless telegraph operator, both for Philippine service. The duties of the two wireless engineers will be to have charge of all instruments and apparatus pertaining to wireless, and they also will superintend the development of special apparatus for sending and receiving messages. Three wireless operators will be appointed.



# Industrial Power

## ELECTRICITY ON THE FARM.[1]—II.

BY JOHN LISTON.

The motors are distributed among the different buildings, and in most cases no special foundations have been required, since one of the advantages of motor drive for farm machinery is the fact that the motors usually required for this service are relatively light in weight and may be mounted either on the machine itself or on the floor, wall or ceiling.

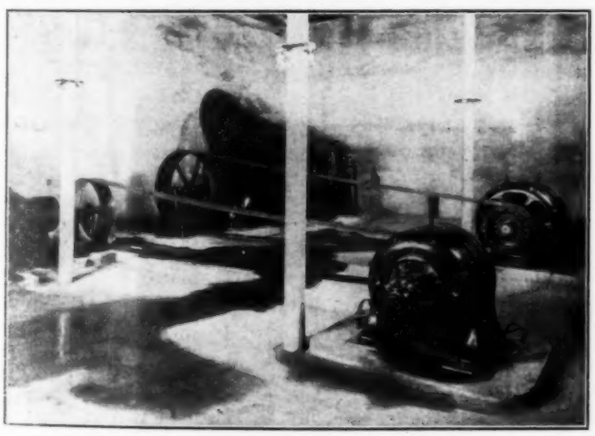
In the main dairy barn a motor-driven hay hoist is installed, to which is geared direct a ten-horsepower motor, a simple drum controller being used to regulate the hoisting speed. The load of hay is driven in onto the main floor of the barn and stopped under an opening to the loft, located in the center of the building. Two U-shaped forks are inserted in the hay by the driver and the hoist is started by a man in the loft and the entire load elevated thereto, the motor controller being so placed near the loft opening as to give the operator an uninterrupted view. The hoist pulley is then automatically tripped, and the load of hay thereby transferred to an overhead rail, along which it is pulled by the hoist to the position selected for it in the loft. The forks are next released by pulling two light tripping ropes and the hay is deposited on the loft floor, the hoist tackle returning for the next load. The entire operation is carried on by two men and a ton of hay can be lifted from the wagon and stored at either end of the 280-foot loft in less than five minutes.

MOTOR DISTRIBUTION.

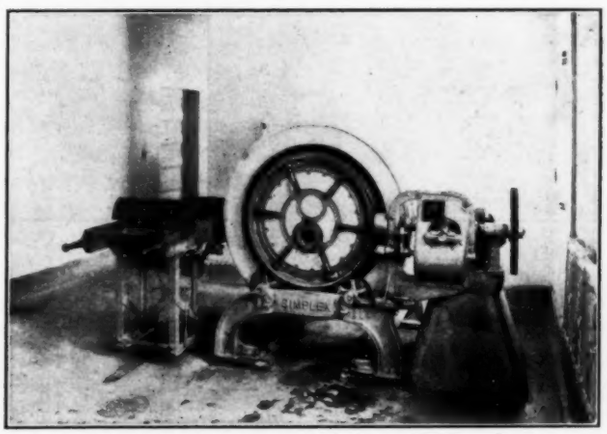
| No. | H.P. | R.P.M. | Department | Service |
|---|---|---|---|---|
| 1 | 10 | 850 | Dairy Barn | Hay Hoist |
| 1 | 2 | 1100 | Dairy Barn | Root Cutter |
| 1 | 1½ | 1350 | Dairy Barn | Vacuum Pump |
| 1 | 1½ | 2000 | Dairy Barn | Cream Separator |
| 1 | 3 | 1440 | Butter Making | Butter Churn |
| 2 | 20 | 650 | Refrigerating | Ammonia Pumps |
| 2 | 3 | 500/1000 | Refrigerating | Brine Circulating Pumps |
| 1 | 7½ | 1500 | Refrigerating | Centrifugal Water Pump |
| 1 | 25 | 600 | Grist Mill | Milling Machinery |
| 1 | 4 | 650 | Sausage | Meat Grinder, Mixer and Bone Cutter |
| 1 | 2 | 1100 | Sheep Barn | Root Cutter |
| 1 | 1½ | 1350 | Sheep Barn | Root Cutter |
| 1 | 2 | 750 | Fish Hatchery | Fish Food Grinder |
| 1 | 7½ | 500 | Woodworking | 30 in. Band Saw |
| 1 | 7½ | 825 | Woodworking | Wood Surfacer |
| 1 | 5 | 1650 | Woodworking | Circular Saw and Boring Machine |
| 1 | 5 | 1650 | Woodworking | Wood Planer |
| 1 | 3 | 500/1500 | Machine Shop | Engine Lathe |
| 1 | 2 | 1100 | Machine Shop | 30 in. Drill |
| 1 | 5 | 900 | Water Supply | Triplex Water Pump |
| | | | | Washing Machine |
| | | | | Centrifugal Dryer |
| | | | | Mangle |

On the main floor of this barn is a root-cutting machine for preparing feed for the cattle. This machine is operated by a two-horsepower motor mounted on the ceiling and belt-connected to the machine, the controller being mounted on the wall beside the machine. In the dairy section is a vacuum pump operated by a 1.5-horsepower motor and supplying power for milking machines. A metallic vacuum pipe leading from the pump is permanently located around the outside of a double row of cow stanchions, with an outlet for each pair of stalls controlled by a single valve. When ready for milking, the motor is started and flexible tubes from the milking machines are connected to the vacuum pipe outlets; soft rubber cups at the ends of other flexible tubes connecting with the milking machine are then placed on the nipples of the cows, where they are securely held by the uniform pressure created by the vacuum.

There are five of these machines used at Heart's Delight farm, each machine milking two cows simultaneously. The suction is applied intermittently by an



ALTERNATORS IN LITTLE CHAZY POWER STATION.



DIRECT-GEARED MOTOR-DRIVEN BUTTER CHURN.

[1] Reprinted by permission (in slightly condensed form) from the *General Electric Review*.

automatic valve on the milking machine; and thus by alternate pressure and relaxation the effect of hand milking is obtained, with the added assurance of absolute cleanliness, since the machines are totally inclosed. The milk as it is withdrawn from the cow passes through a short glass tube in the top of the machine and is in this way made visible to the operator, who is thus enabled to stop the process at the proper time. The milk is then carried to a room located on the same floor and provided with a motor-driven separator. After being tested it is passed through the separator, the cream being thence taken to the butter making section of the dairy building.

A 1.5-horsepower vertical-shaft motor having an initial speed of 2,000 revolutions per minute runs the separator. Upon its arrival in the dairy building the cream is deposited in a covered tank and is ripened before being piped to the churn. The churn is driven by a three-horsepower motor, which is mounted directly on the churn frame and drives it and its auxiliaries through gears which are inclosed in a sheet iron casing to insure safety and cleanliness.

The motor-starting rheostat is mounted on the wall back of the churn, the solenoid of the rheostat being arranged so that it can be short-circuited from the front of the churn, thus permitting the operator to stop the churn instantly, at a distance from the rheostat, by simply pressing a button.

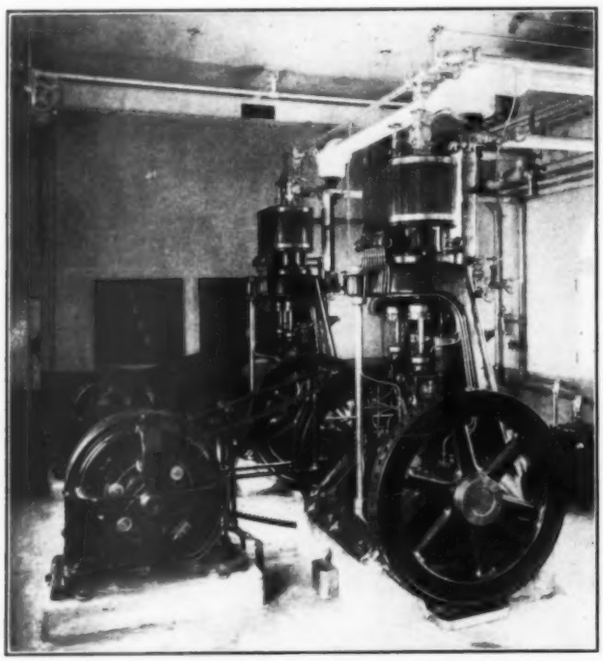
All the milking and butter-making processes are carried on by or under the direct supervision of experts; this arrangement together with the high grade cattle and scientific feeding insuring the best quality of dairy products and a correspondingly good market.

Near the dairy building is an ice-making plant with a capacity of twenty tons every twenty-four hours. Motors are utilized for driving the pumps, although there is also a steam equipment for the purpose; this, however, is held only as a reserve. Two ammonia pumps are driven through chain drive by two twenty-horsepower motors, and the brine circulation pumps by two three-horsepower motors, also through chain belts.

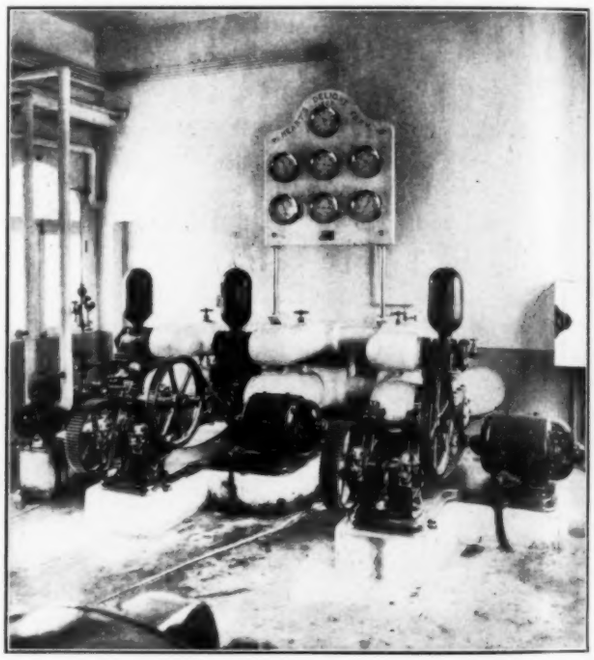
This plant uses only spring water and furnishes ice for drinking purposes, for cold storage, and for the shipment of products affected by changes in temperature.

A small centrifugal lit pump direct-connected to a 7.5-horsepower motor is located in the ice machine building and elevates water to a nearby tower tank. This motor runs at 1,500 revolutions per minute, and as both the centrifugal type of pump and the electric motor operate best at relatively high speeds, this unit is a particularly good example of a compact, high-efficiency pumping set. If necessary, it can be equipped with a device which will automatically maintain a predetermined water level in the tank.

A substitute grist mill is included among the farm buildings and the machinery in this is driven through countershafting by means of a twenty-five-horsepower motor, housed in a separate building to eliminate the fire risk due to the presence of inflammable grain dust in the mill. Many modern grist mills, however, use motors which are installed in the mill buildings, and the polyphase induction motor is peculiarly adapted for this service owing to the absence of a commutator, thus eliminating the potential danger from sparking brushes.



MOTOR-DRIVEN AMMONIA PUMPS IN ICE-MAKING PLANT.



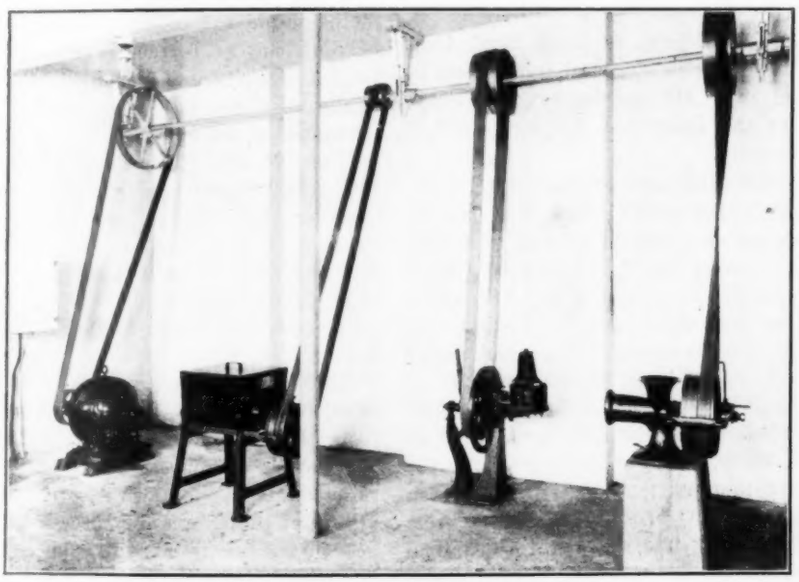
MOTOR-DRIVEN BRINE PUMP IN ICE-MAKING PLANT.

The grist-mill motor is not set on permanent foundations, but is mounted on a truck and can therefore be readily transported to other buildings for temporary or emergency service. It is taken out in the field in this way and used to drive a threshing machine, the necessary conductors being laid along the ground to supply the current.

The use of portable motors for field work on farms is becoming of increasing importance wherever electric current is available. A notable example of its possibilities was recently given in Germany, where two motors were used to pull plows across a field by means of steel cables actuated by motor-driven drums. Two portable

motor-driven outfits were located on opposite sides of the field and moved forward as the plowing progressed. Of course, this method of plowing would only be practical under certain conditions; but it illustrates the all-round adaptability of the electric motor for farm work.

An item of growing importance at Heart's Delight farm is the production of sausage, the meat-chopping and mixing machines for which are driven by a single four-horsepower motor utilizing an overhead countershaft. The sausage casings are filled by a machine operated by hydraulic pressure and compressed air, and in this way two men can maintain continuous production up to the capacity of the sausage-making equipment.



MOTOR-DRIVEN SAUSAGE-MAKING MACHINERY.

The two sheep barns are supplied with root-cutting machines driven through belting by motors of 1.5 and two-horsepower capacity. The motors are mounted on shelves and therefore occupy no space which could be otherwise utilized.

One of the farm auxiliaries is a thoroughly equipped fish hatchery used for the propagation of trout. A number of concrete fish ponds, located at slightly different levels in order to maintain the necessary water motion, have been constructed, and the fish food is prepared by a grinding machine, belt-connected to a two-horsepower motor.

Every farm occasionally requires carpentry work, and the use of up-to-date wood-working machinery will always expedite such work and lessen the labor cost.

The utility of the electric motor in the operation of woodworking machinery on the farm, for farm building construction and repairs, and for repairing wagons, etc., is well demonstrated here, where the wood-working building contains a thirty-inch band saw and a wood surfacer, each driven by a seven and one-half-horsepower motor. The band saw is directly connected to the driving shaft of its motor, while the wood surfacer is driven from a countershaft. There is in addition a wood planer, which is driven by a five-horsepower motor, and a circular saw and a wood-boring machine, also driven by a five-horsepower motor.

In connection with this woodworking shop, there is a machine shop having a thirty-inch drill driven by a two-horsepower motor and an engine lathe driven by a three-horsepower motor, both motors being mounted directly on the machines and driving them through gearing.

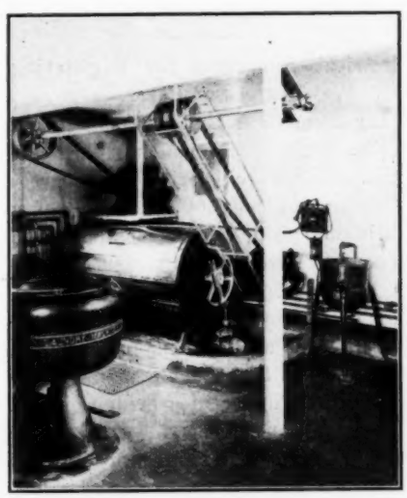
The blacksmith shop has not as yet been electrically equipped, but a motor-driven centrifugal forge blower and a motor-operated trip hammer will be installed there at an early date.

While windmills are used for pumping the water for some of the outlying buildings on the farm, there is also a five-horsepower induction motor installed in a pump house and direct-connected to a triplex reciprocating water pump. This is the only alternating-current motor installed on the farm at present, but the further adoption of this type of motor is being considered in providing for the future extension of the electrical service, as it is the best form of motor for operations requiring a constant speed.

In addition to the present equipment, motors will hereafter be utilized on this farm for shearing sheep, clipping horses and other similar work.

Motor drive has been extended to the housework, and there are installed in the laundry of the main house of the farm, known as "Heart's Delight Cottage," a clothes-washing machine driven by a three-horsepower motor, a centrifugal dryer operated by a two-horsepower vertical-shaft motor, and a mangle driven by a direct-connected motor of 0.4 horsepower.

Among the auxiliary electrical devices at the cottage are an electric



MOTOR-DRIVEN WASHER AND DRYER.

piano, heating and cooking devices, and a motor-driven ice-cream freezer. Fan motors are also liberally provided.

Electricity on the farm not only permits the ready application of power to machinery located in widely separated buildings, but insures the safe and most efficient lighting for both buildings and farm yards.

At Heart's Delight Farm the buildings are all lighted with incandescent lamps, and in order to insure absolute safety they are inclosed in vapor-proof inclosing globes which fit into porcelain bases, the wiring being all run through iron conduit. In the yards the high efficiency of the flaming arc lamp for the lighting of large areas has resulted in its adoption for the purpose,

and four lamps of this type are used, one of them being installed on the top of the 134-foot steel tank tower. At an early date, the lighting system will be extended to the roadways.

In accomplishing the electrification of this farm, every effort has been made to preserve the natural beauties of the farm lands. The concrete dams are smoothly finished and the penstocks covered by earth embankments which have been carefully sodded. The wiring to the various farm buildings is carried underground in conduits, and as a consequence there are no unsightly effects produced by the various conductors which radiate from the farm power station.

Heart's Delight Farm has had electric service for a period of about three years during which time it has been definitely proven that the electric motor can be applied with unqualified success to the operation of all machinery used in farm buildings.

### Electrical Apparatus for Registering Degrees of Fever.

The Siemens & Halske Company, of Berlin, is manufacturing an electrical apparatus for registering the degrees of fever. It consists essentially of a platinum spiral, which constitutes an element of resistance, a measuring outfit and a registering milli-voltmeter. The platinum spiral is placed in the arm-pit of a sick person, for instance, and attached by a double conductor to the milli-voltmeter in a bridge circuit. The current necessary for making the measurements is furnished by a small four-volt accumulator. The indications of the milli-voltmeter are due to changes in the resistance of the platinum spiral and correspond to variations of temperature in the body of the patient.

In one form of this arrangement the movable equipment of the milli-voltmeter traces a curve on a paper band moved by clockwork.

Fever curves obtained in this manner in the medical clinic of Berlin have shown clearly the action of drugs on a patient, as the injection of tuberculine, the administration of antipyrine, etc. The registering apparatus may be given different forms, according to the use for which it is intended. The platinum spiral is enclosed in a quartz glass tube in order to make it absolutely invariable.—*Translated and Abstracted from L'Electricien (Paris), March 26.*

## AMONG THE CONTRACTORS AND SUPPLY MEN

To know what is going on among the men who do things and those who supply the material for the doing is always interesting. The actual happenings of the day with the contractors and the men who furnish them with supplies of all kinds, accurately reported from all parts of the country, is the object of this department.

THE MODERN ELECTRIC AND FIXTURE COMPANY, of Fresno, Cal., has been incorporated by H. H. Cartwright, W. F. Bledsoe and J. H. Blake. The company is capitalized at $25,000.

H. F. ROSS, Riverside, Cal., secured the contract for wiring the First National Bank building of Riverside. The contract price was $2,750, and the terms specify that the work must be completed by October 1. The contract includes the installation of electrical and telephone wires and switchboard.

W. R. SMITH, of South Bend, Ind., will engage in electrical contracting in that city. He was formerly connected with the Indiana & Michigan Electric Company.

THE BELOIT ELECTRIC SUPPLY COMPANY, Beloit, Wis., has begun an electrical contracting and supply business there. The company deals in electric supplies such as fans, motors, irons and other electrical devices. It will also do wiring and general repair work. The head of the company is Jason E. Valentine, a former resident of Beloit, and the local manager is C. H. Waite.

H. F. HIGGINS & COMPANY, Wilmington, Del., received a contract from Charles Baird & Company to install in their morocco plant all electrical equipment necessary to generate electric power for the plant. This will include generators, motors, wiring, etc., and will be one of the largest similar contracts ever let out by a firm engaged in the manufacture of morocco. Not only the old plant of the company will be equipped with the electrical apparatus, but the old property of W. Jones & Co. as well. The electrical apparatus will be installed at once.

THE RAPP-ZOLLINGER ELECTRICAL COMPANY, Ft. Wayne, Ind., was recently formed by Fred Rapp and George Zollinger. In turn, this company has purchased the Wood Electric Company stock and appliances, of South Bend, which will be removed here to form the nucleus of a new electric manufacturing establishment to be located on East Columbia Street. The company will manufacture and install motors and electric systems. Mr. Zollinger left recently for South Bend to superintend the removal of the Wood plant to Fort Wayne.

THE PAXTANG ELECTRIC COMPANY, Harrisburg, Pa., recently began work on the underground conduit which is to carry the cables for the cluster lights at the post office. All overhead wires around the federal building are to be taken away.

### The Production of Guayule Rubber.

The high price of rubber is stimulating the guayule rubber manufacturing industry in Northern Mexico. Several new factories of large capacity are planned and their erection will soon be started. The great rubber manufacturing plant of the Continental Rubber Company at Torreon is running to its full capacity day and night. Practically all of the land upon which the wild guayule shrub grows is now owned or leased by the different rubber manufacturers, but active work of propagating the shrub from the seed upon the cut-over lands as well as upon heretofore unproductive tracts is in progress. It is claimed that there is no question as to the permanency of the new industry.

More than twenty per cent of the rubber output of the world now comes from the guayule shrub in Northern Mexico and Southwestern Texas, it is claimed. It loses its identity after it is put through the refining process and goes on the market as Para rubber, being mixed with the rubber tree product for most purposes.

It is stated by the United States consular agent for the Torreon district, that the total value of the crude guayule rubber exported to the United States from Torreon and other points in his district during the months of January, February and March was $3,943,330 United States currency. It is estimated that the exportations of guayule rubber from other consular districts in Northern Mexico to the United States during the same period was not less than $2,000,000 United States currency, and that the exports of the product to Europe were valued at more than $2,000,000 during the same period. This would make the total output of the crude guayule rubber for the three months about $8,000,000 gold.

KILOWATT-YEAR.—Please define a kilowatt-year.—C. R., Marquette, Mich.

A kilowatt-year is the amount of electrical energy supplied continuously to a circuit in one year, or 8,760 hours, at the constant rate of one kilowatt per hour. In other words, it is equivalent to 8,760 kilowatt-hours.

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RUNNING 110-VOLT MOTOR ON 220-VOLT CIRCUIT.—We have a direct-current, shunt-wound 100-volt motor of about one horsepower that we want to run on the 220-volt system. We connected it in series with a sixteen-candlepower 110-volt lamp but it would not start. By connecting it as a series motor (armature in series with field) it will run at very low-speed, about sixty revolutions per minute. When connected as a shunt-motor the lamp seems to take most all of the voltage, but when connected as a series motor the lamp only takes 110 volts. Can the motor be made to run on the 220-volt system? If not, why not? If it can, please explain connections.—W. C. C., Alton, Ill.

If the motor is to run at practically constant speed with greatly and suddenly fluctuating load, it had better be exchanged for a 220-volt motor or entirely rewound for 220 volts. If the load will be fairly constant, the motor can be used on the 220-volt system by placing in series with it a suitable rheostat. This rheostat should be capable of carrying up to nine or ten amperes with 110 volts at its terminals and should have at least five intermediate steps. A set of incandescent lamps may be used as an adjustable rheostat. For this purpose nine or ten thirty-two-candlepower, 110-volt, carbon-filament lamps should be connected to a common lead on one side and this lead-joined to one side of the 220-volt circuit; on the other side each lamp should be connected to an independent brass clip under which a brass or copper bar may be made to pass so as to make good electrical contact with any number of the lamps; to this bar should be secured a flexible lead going to one of the motor terminals, the other one of which is connected to the other side of the 220-volt circuit. In this way a variable number of the lamps connected in parallel is placed in series with the motor. In starting the motor push the bar in so as to place two of the parallel lamps in series with the motor, then add one lamp at a time till the motor comes to speed. When the load changes the speed will change with any form of rheostat in series with the motor, so with change of load the number of lamps should be readjusted, more lamps being added for increase of load. The single lamp that was used could not carry sufficient current to start the motor. The motor may be run at considerably below normal full speed as a series motor having in series with a similar group of such lamps connected together in parallel, but it will operate best as a shunt-motor in the manner first described.

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EXPLANATION OF ELECTRICAL UNITS.—Please explain in practical language the meaning of the following electrical words: volt, ohm, ampere, resistance, retardation, cycle, microfarad, henry, kilowatt-hour, ampere-hour.—D. R. W., Tulsa, Okla.

The volt is the practical unit by which electromotive-force or electric pressure is measured; it corresponds roughly to the electromotive force of a gravity or Daniell primary battery, so that about 110 of these cells connected in series would have a pressure corresponding to that of the ordinary 110-volt system. The ohm is the practical unit of electrical resistance; 1,000 feet of No. 10 B. & S. copper wire has a resistance at ordinary temperature of practically one ohm. The ampere is the practical unit of electric current; a circuit having a pressure of one volt impressed on its terminals between which there is a resistance of one ohm, will carry one ampere; a thirty-two candlepower, 110-volt carbon-filament incandescent lamp takes about an ampere current. Resistance is the property possessed by all substances to a greater or less degree of opposing the passage of electricity through them; it depends on the physical character, chemical purity and temperature of the substance and the length and area of the circuit through them. Retardation is a term not used electrically except in connection with the slowing down of a generator or motor after the driving power is shut off; resistance does not retard or slow down the speed of the electric current but merely reduces its value by direct opposition. Cycle is the name given to a complete reversal of an alternating current, including its change from zero value to maximum in one direction, decrease back to zero, then increase to maximum in the opposite direction and finally decrease back again to zero; these four changes follow each other in every cycle. The microfarad is the practical unit of capacity or the amount of electricity it takes to charge a condenser to one volt pressure; the microfarad has one-millionth the value of a farad, which is the capacity of a condenser that when charged to one volt pressure between its terminals would hold such a quantity of electricity as corresponds to what would pass per second in a circuit that carries a current of one ampere. The henry is the practical unit of self-induction or the ability of a circuit containing largely coils or adjoining magnetic materials to develop an electromotive force when the current in it is suddenly changed; in value the henry represents the self-induction of a circuit in which one volt is generated when the current changes at the rate of one ampere per second. The kilowatt-hour is the practical unit by which electrical energy is measured and sold; it represents the energy supplied continuously for one hour to a circuit in which the product of the current in amperes and the pressure in volts is equal to 1,000. The ampere-hour is the practical unit of quantity of electricity; it represents the quantity of electricity passing in a circuit per hour in which the current is one ampere, regardless of the voltage; the ampere-hour is used commonly in stating how much of a charge a storage battery will hold.

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### Copper Imports.

Imports of copper for the month of March were 12,200 tons, compared with 11,700 tons the same period last year.

## FINANCIAL REPORTS OF ELECTRICAL COMPANIES.

### PHILADELPHIA COMPANY.

The report of the Philadelphia Company for the month of March and twelve months ended March 31, compares as follows:

| | 1910 | 1909 |
|---|---|---|
| March gross | $1,907,891 | $1,630,172 |
| Expenses and taxes | 974,144 | 799,826 |
| March net | $ 933,747 | $ 830,346 |
| Twelve months gross | 19,790,799 | 17,184,251 |
| Expenses and taxes | 11,189,506 | 9,555,112 |
| Twelve months net | $ 8,601,293 | $ 7,629,139 |

### NEW ENGLAND TELEPHONE AND TELEGRAPH COMPANY.

The New England Telephone & Telegraph Company has issued its annual statement for the year ended December 31, 1909, which we compare as follows:

| | 1909 | 1908 |
|---|---|---|
| Gross | $12,086,782 | $11,259,130 |
| Operating expenses | 8,902,833 | 8,698,718 |
| Net | $ 3,183,949 | $ 2,560,412 |
| Dividends | 2,191,866 | 2,076,841 |
| Surplus | $ 992,083 | $ 483,571 |

### KANSAS CITY RAILWAY AND LIGHT.

The report of the Kansas City Railway and Light Company for the month of March and ten months ended March 31 compares as follows:

| | 1910 | 1909 |
|---|---|---|
| March gross | $ 622,555 | $ 561,774 |
| Expenses | 347,083 | 315,171 |
| March net | $ 275,471 | $ 246,603 |
| Charges and taxes | 160,665 | 156,799 |
| March surplus | $ 114,806 | $ 89,803 |
| Ten months gross | 5,961,714 | 5,500,067 |
| Expenses | 3,354,467 | 3,130,220 |
| Ten months net | $2,607,247 | $2,369,847 |
| Charges and taxes | 1,576,179 | 1,572,076 |
| Ten months surplus | $1,031,067 | $ 797,771 |

### NEW ORLEANS RAILWAY AND LIGHT COMPANY.

The New Orleans Railway and Light Company has issued its report for the year ended December 31, 1909. The income account compares as follows:

| | 1909 | 1908 |
|---|---|---|
| OPERATING REVENUE. | | |
| Railroad department | $4,101,545 | $4,033,789 |
| Electrical department | 1,927,898 | 1,046,776 |
| Gas department | 904,881 | 887,933 |
| Total operating revenue | $6,034,325 | $5,968,498 |
| OPERATING EXPENSES. | | |
| Railroad department | $2,403,076 | $2,468,366 |
| Electrical department | 525,806 | 487,517 |
| Gas department | 400,019 | 409,101 |
| Total operating expenses | $3,328,901 | $3,364,985 |
| Net operating revenue | $2,705,424 | $2,603,513 |
| Taxes | 481,750 | 476,727 |
| Operating income | $2,223,674 | $2,126,786 |
| Other income | 8,569 | 10,497 |
| Total income | $2,232,243 | $2,137,284 |
| Interest, reserves, etc. | 1,571,769 | 1,566,790 |
| Surplus | *$660,474 | $570,494 |
| Preferred dividends | ..... | ..... |
| Surplus | $660,474 | $570,494 |

* After deduction of five per cent dividend on $10,000,000 preferred stock, the balance is equal to eight-tenths of one per cent earned on $20,000,000 common stock as compared with three-tenths of one per cent on same stock last year.

### J. G. WHITE & COMPANY.

J. G. White & Company, of New York city, have just issued a report for the fiscal year ended February 28, 1910. The assets and liabilities of the company are given as follows:

ASSETS.

| | | |
|---|---|---|
| Good will, purchase of business, plant, tools, instruments, etc., etc. (new furniture and fixtures purchased during period written off as heretofore, $3,133.12) | | $1,499,037.46 |
| Uncompleted contracts and undertakings at cost, including plant, tools and equipment specially purchased therefor or transferred from closed contracts | | 331,160.45 |
| Securities owned and syndicate participations, as valued by committee of directors | | 1,765,816.19 |
| Bills receivable | | 54,516.09 |
| Accounts receivable | | 444,669.06 |
| Interest and dividends accrued | | 7,361.58 |
| Working capital at construction and branch offices (Net) | | 42,604.61 |
| Cash in banks and in office | | 302,181.59 |
| | | $4,447,347.03 |

LIABILITIES.

| | | |
|---|---|---|
| Capital authorized: | | |
| 20,000 shares common stock of $100 each | $2,000,000.000 | |
| 30,000 shares of six per cent cumulative preferred stock of $100 each | 3,000,000.00 | |
| | $5,000,000.00 | |
| Capital issued: | | |
| 15,000 shares of common stock of $100 each, fully paid, of which twenty-two shares are held by a trustee for the benefit of the Company | $1,500,000.00 | |
| 20,000 shares of six per cent cumulative preferred stock of $100 each, fully paid | 2,000,000.00 | $3,500,000.00 |
| Bills payable | | 400,855.00 |
| Accounts payable | | 125,097.88 |
| Sundry stockholders for dividend on six per cent cumulative preferred stock, payable May 1, 1910 | | 30,000.00 |
| Surplus or undivided profits | | 391,394.15 |
| | | $4,447,347.03 |

### UNITED ELECTRIC COMPANY OF NEW JERSEY.

The United Electric Company of New Jersey has reported for the year ended March 31, 1910, compared as follows:

| | 1910 | 1909 |
|---|---|---|
| Gross earnings | $3,277,384 | $2,901,691 |
| Operating expenses and taxes | 1,411,328 | 1,292,622 |
| Net earnings | $1,866,056 | $1,609,069 |
| Bond interest | 779,226 | 779,210 |
| Surplus | $1,086,830 | $ 829,859 |

### GENERAL ELECTRIC COMPANY.

In the eighteenth annual report of the General Electric Company, the profits for the year ending December 31 are $6,493,670.88. The value of stocks and bonds carried over from last year are not changed. A larger percentage than usual was given over to acquiring land, erecting buildings, etc., and considerable money has been spent for lamp patents.

In announcing the work that has been done in engineering, the report states that high-voltage transmission apparatus has been much improved. The company has also selected a number of engineers to specialize on various industrial power applications such as will be found in the operation of paper mills, cement mills, cotton mills, printing presses, machine tool drive, etc. These engineering specialists give careful study to the problems which arise in connection with the electrification of such industries and advise and co-operate with their customers. As a result their business in this line has already increased.

Its engineers have redesigned and greatly improved the line of mining locomotives and the sales have shown a large increase over the previous year. Much other apparatus has been improved.

The consolidated balance sheet showing the assets and liabilities of the company follows:

ASSETS.

| | | |
|---|---|---|
| Patents, franchises and good-will | | $ 1.00 |
| Cash | | 17,623,466.72 |
| Stocks and bonds | $22,329,663.71 | |
| Real estate (other than factory plants) | 118,063.34 | |
| Notes and accounts receivable | 19,377,972.37 | |
| Work in progress | 462,223.41 | |
| | $42,287,922.83 | |
| Merchandise Inventories: | | |
| At factories | $21,610,283.91 | |
| At general and local offices | 3,321,870.94 | |
| Consignments | 217,880.92 | |
| | $25,150,035.83 | |
| | | 67,437,958.66 |
| Factory plants (including all lands, buildings and machinery) | $14,330,958.12 | |
| Copper mining investment | 3,048,604.41 | |
| | | 17,379,562.53 |
| | | $102,440,988.91 |

LIABILITIES.

| | |
|---|---|
| Five per cent gold coupon debentures of 1892 | $ 40,000.00 |
| Three and a half per cent gold coupon debentures of 1902 | 2,047,000.00 |
| Five per cent gold coupon debentures of 1907 | 12,875,000.00 |
| Accrued interest on debentures | 83,664.58 |
| Accounts payable | 2,753,617.30 |
| Advance payments on contracts | 777,133.34 |
| Dividend payable January 15, 1910 | 1,303,592.00 |
| | $ 19,880,007.22 |
| Capital stock issued | $ 65,179,600.00 |
| Surplus | 17,381,381.69 |
| | $102,440,988.91 |

### DETROIT UNITED RAILWAY.

The report of the Detroit United Railway Company, for the month of March and three months ended March 31, 1910, compares as follows:

| | 1910 | 1909 |
|---|---|---|
| March gross | $ 725,232 | $ 589,287 |
| Expenses | 470,406 | 360,743 |
| March net | $ 254,826 | $ 228,544 |
| Other income | 12,074 | 11,988 |
| Total income | $ 266,900 | $ 240,532 |
| Charges and taxes | 161,871 | 152,090 |
| March surplus | $ 105,029 | $ 88,442 |
| Three months' gross | 1,992,403 | 1,668,041 |
| Expenses | 1,294,590 | 1,064,151 |
| Three months' net | $ 697,813 | $ 603,890 |
| Other income | 36,637 | 34,556 |
| Total income | $ 734,450 | $ 638,446 |
| Charges and Taxes | 479,669 | 460,249 |
| Three months' surplus | $ 254,781 | $ 178,197 |

*Taxes in 1908 are included in operating expenses.

## NEBRASKA ELECTRICAL ASSOCIATION.

THIRD ANNUAL CONVENTION AT LINCOLN, NEB., MAY 3, 4 AND 5.

The third annual convention of the Nebraska Electrical Association was held in Lincoln, Neb., May 3, 4 and 5. The attendance was larger than at any former convention, and a good programme was carried out successfully. The headquarters of the association were established at the New Lindell Hotel.

The meeting was called to order by President B. C. Adams on Tuesday, May 3, at 10:30 a. m. Mayor Don C. Love, in his address of welcome to the members of the association, touched upon the question of municipal ownership, making certain comparisons as to the economy of municipalities owning their own street railways, lighting plants, etc., which statements were controverted at a later session. After a response to the mayor's address by W. J. Scoutt, President Adams delivered his address, an abstract of which follows:

Since our association was formed, there has been organized what is called a "Municipal League." I take it that this league has been started for the purpose of promoting the interests of municipal ownership and with an antagonistic attitude toward privately owned public utilities. I am sure that we would all congratulate this league providing it were to make a conscientious and systematic effort to discover the actual operating costs in the municipally operated electric light plants. I doubt very much if it will do this. Several of our companies are now in litigation with the municipalities and others are threatened. The league will, no doubt, be found furnishing information and advice to those fighting for municipal ownership and it remains for our association to furnish facts and information to those of our membership fighting for existence. It is to be regretted, not only on our part, but on the part of our consumers, that the electric-light plants do not receive the due consideration, protection, and cooperation from the city governments as do the various business industries which are located in the same towns with them. It is unfortunate that the companies in this state do not have a uniform system of accounting and a uniform method of rate making. If we had, I believe that some of the agitation against our companies would be eliminated. I would recommend to the association that through its officers a record be kept of the relation existing between its different members and the city governments under which they operate; also a record of all court proceedings. Such information could then be furnished our members as a guide and perhaps a form of protection, in case unavoidable litigation proceedings are started, either by themselves or the municipality.

The first paper to be presented in the afternoon session was one entitled "Exhaust Steam Ice Making" by Heywood Cochran, manager, Carbondale Machine Company, Chicago. The paper was illustrated by the stereopticon.

In the absence of Joel Roberts, his paper on "Tungsten Lamps" was read by the secretary. An abstract follows.

We find that our load has not increased in the same proportion as formerly, yet we have had a very large increase of consumers and at the same time our earnings have shown an increase. I think this is due to the fact that the tungsten lamp gives a great deal more light for the same money thereby giving more satisfactory service. The home that is lighted with tungsten lamps shows up so brilliantly that the neighbor across the way who has been content to use a kerosene lamp begins to take notice. He is surprised on investigation to find it possible to get so much light at so reasonable cost and he gives an order at once for wiring and lighting his own home. From this source, business in our town has increased more than it ever has before. We find that the consumers do not object to paying a good-sized light bill when they get good service, and in giving good service we find that a satisfied consumer is also one of our best advertisements. We find the tungsten lamp a formidable rival of the gasoline system and we are steadily replacing these gasoline systems with tungsten installation.

H. A. Holdrege in discussing this paper stated that the Omaha Light and Power Company found tungsten lamps very useful in competing with gas. One of the main advantages of the tungsten lamp, as brought forth by the discussion, is that it gives the customer more light for the same money and thereby makes a satisfied and regular customer.

Mr. Seaberry, a representative of a lamp company, predicted that the tantalum and tungsten lamps would entirely supersede the carbon lamp.

At the Wednesday morning session the first subject for consideration was "Concrete Pole Construction" by C. A. Snider, Auburn, Neb. Mr. Snider's remarks are presented herewith in condensed form. The top section of one of the regular concrete poles manufactured by him was exhibited, showing in particular the cross-arms, steps, etc.

In the pole described, the proportion is one of cement to six and one-half of stone and sand. In making the pole it is placed in a pattern and left for a period of twenty-four hours. It is then taken out of the pattern and allowed to dry. After about ninety days of seasoning or drying the concrete poles can be handled as roughly as wood poles. On account of their weight the most convenient method of handling the concrete poles is to haul them to the point where they are to be used on sleds in the winter time. The secret of making the poles strong is in getting the reinforcement close to the surface. In a forty-foot pole there is about 200 pounds of steel. The poles are usually set about one-fifth of their length in the ground. The strength of the poles has been tested and it was found that they will stand a strain of an eight-inch top cedar pole. Also, their cost is less. A lightning wire is run over the top, because the steel construction apparently has more attraction for the lightning than the wood poles.

"Power Plant Reports and Records" was the subject of a paper presented by G. S. Sprague, of Geneva, Neb., in which the author related his observations in regard to the lack of system in the average small central station with relation to keeping accurate accounts. He stated that the most important individual item of expense in the average steam plant is the coal. What is wanted is how many pounds of coal are burned to produce a kilowatt-hour. Various methods were suggested for determining this point and the benefits to be derived from keeping systematic records on matters in general were emphasized.

Along the same line, N. A. Kemmish, Lincoln, Neb., read a paper on the subject of "Power Plant Operation," which is briefly abstracted as follows:

The question which confronts all central station men is how to improve the station's economy and efficiency. The first step toward improving economy in operation is to have system and organization. This is very much neglected even in the larger central stations. There should be a systematic and standard method of keeping records of the various costs and consumption of the plant in order that an intelligent idea can be had of what the station is doing and these things showing excessive costs should be investigated and the cost reduced. There should be a careful and industrious man at the head of the boiler plant, a man who knows how much coal a fireman can and ought to handle per shift, and how it ought to be fired to get the greatest amount of steam per dollar's worth of coal. He should be a man who will keep down leaks, repairs, forestall accidents and shutdowns. A fireman can easily waste his wages in a day by careless firing. Here is where a good man needs encouragement and a careless one a time check. It does not, however, all depend upon the fireman but partly on the kind of coal used. As the price of coal keeps advancing it makes the central-station operator figure more closely on getting all he can out of a pound of coal. The matter of purchasing coal should be given a great deal of consideration, as the economy of the plant depends largely on the quality of coal burned. The man who purchases the coal usually knows but little of the characteristics of the coal he purchases, and seldom, if ever, does he consult the engineer before buying it.

The adaptability of coal is more necessary in stokers than in hand-fired plants, as some coals require being stirred in order to burn freely. Coal should be tested under plant conditions to see if it is adapted to the system of firing employed, and to determine what it costs to evaporate 1,000 pounds of water with the various coals.

Owing to the lateness of the hour the discussion of these papers was very limited. E. A. Bullock, however, stated that, in his opinion, system was given too much consideration, and that the practical operation of a plant would not coincide with theoretical figures.

Municipal ownership, though not one of the assigned topics for Wednesday afternoon, was brought up for consideration at the request of President Adams by W. J. Scoutt, of Kear-

ney, who replied to the statements of Mayor Love on the preceding day relative to economies resulting from the public proprietorship and operation of waterworks and lighting utilities in Lincoln, showing conclusively by accurate deductions from the city auditor's report that the municipal plant of Lincoln had not been operated at a profit if placed upon the same basis of accounting with the privately owned plants. Mr. Scoutt strongly urged uniform accounting for municipal and privately owned plants as the only fair basis to determine the efficiency of the two systems.

C. R. Richards, dean of the Engineering College of Lincoln, addressed the association in regard to the work that was being done at the university and invited the members not only to visit the engineering department but to contribute their moral support to that institution. Professor Richards outlined the growth of the science of engineering in this country. He stated that it was the privilege of his college to claim Bion J. Arnold, who is known all over the world, as one of its alumni. J. G. White was also mentioned as having been connected with the college.

"Securing Off-the-Peak Load" was the subject of a paper presented by Harry G. Glass, of the Westinghouse Electric and Manufacturing Company. Mr. Glass discussed the subject ably, giving many timely suggestions as to the methods of getting the continuous use of the power generated.

S. F. Dibble, of the General Electric Company, led the discussion, emphasizing the point that the central-station men, and not the dealers, should sell motors, stating that the former were really the ones interested and were also in a position, intelligently, to inform prospective customers of the kind of motors they require.

After the convention adjourned for the day, the Lincoln Traction Company furnished a special car in which members of the association were taken to the company's plant for a tour of inspection. Later, the party inspected the power plant of the Lincoln Gas and Electric Company. The city lighting plant was not visited by the members in a body, but a number of individual members paid visits at various times during the convention.

The Thursday morning session was opened by an extemporaneous address on the subject of public-service commissions by E. C. Hurd, expert for the Nebraska Railway Commission.

Mr. Hurd said that the public-service commission in the minds of some people originated for about the same reason that our juvenile courts came into existence,—a principle of discipline was the idea. A great many questions have arisen in local districts and prejudices have grown up which are biased largely by reason of misapplied knowledge, ignorance and, in some cases, intrigue. The speaker's idea of a commission is that political issues should not obtain in any manner with reference to the control of public utilities. Consumers sometimes complain of conditions or rates without any real knowledge of the matters involved. They think a company is paying an enormous dividend and that rates ought to be reduced. Then they go to a councilman and get him to introduce an ordinance to that effect. On the other side, private ownership has produced manipulators who juggle stocks and bonds on which they demand the right to earn an unfair rate. The commission steps in as an agency to protect both the consumer and the user of public utilities.

J. R. Cravath, speaking on the same subject, narrated the results secured through regulation by commissions in Massachusetts and Wisconsin, and the experiment along that line which is about to be made in Ohio.

H. A. Holdrege next made an extemporaneous address on the subject of "Distribution Systems—Light and Power."

With slight variations, said Mr. Holdredge, the following should be considered standard: A voltage of 2,300 with a frequency of sixty; allowing for exceptions, for any city in Nebraska outside of Lincoln and Omaha, the maximum requirement should be one three-phase and three single-phase feeders, and one series circuit for arc or incandescent lights; nothing smaller than No. 6 wire should be used; lightning arresters should be installed at frequent intervals, at least one set for every mile of circuit; transformers should be fused heavily to take care of overloads.

In a report of the convention of the Iowa Electrical Association, E. A. Bullock commended the Nebraska Electrical Association for not giving special consideration to exhibits.

At the Thursday afternoon session, B. L. Smith, of Nelson, gave a summary of information regarding "Rates to be Charged in Cities of from 1,000 to 2,000 Inhabitants" collected from plants in small towns. Many different methods of charging as well as considerable variation in rates, were exhibited. Some charged for meter rent, others had a minimum charge and various scales of discounts were shown.

President Adams added that the ideal system is a sliding scale on a curve, so that the more a consumer uses the less proportionate price he pays. In Lincoln over one-half of the business of the lighting companies has been placed on the readiness-to-serve basis.

Otto Mallat, of the Lincoln Gas and Electric Company, read an exhaustive discussion of the subject of "Electric Meters for Light and Power."

This closed the regular programme with the exception of reports of committees and the election of officers.

An effort was made by Harry G. Glass on behalf of T. C. Martin, Executive Secretary of the National Electric Light Association, to have the members of the Nebraska Association become members of the National Electric Light Association. A report by H. A. Holdrege also recommended that the members of the Nebraska Association take steps to join the National Electric Light Association.

Fred H. Gurtler, representing the Chicago Association of Commerce, extended an invitation on behalf of that body to the Nebraska Electrical Association to convene in Chicago at its next annual meeting during the International Municipal Congress and Exposition, September 18 to September 30, 1911, or at least to send a large delegation. The matter was referred to the executive committee for consideration.

The election of officers resulted as follows: President, B. C. Adams, Lincoln, Neb.; vice-president, F. H. Brooks, Lincoln; secretary-treasurer, Frank McMaster, Beatrice.

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Copper exports for the week ended May 5 were 3,062 tons; since the first of May there were 2,422 tons, compared with 6,422 for the same period last year.

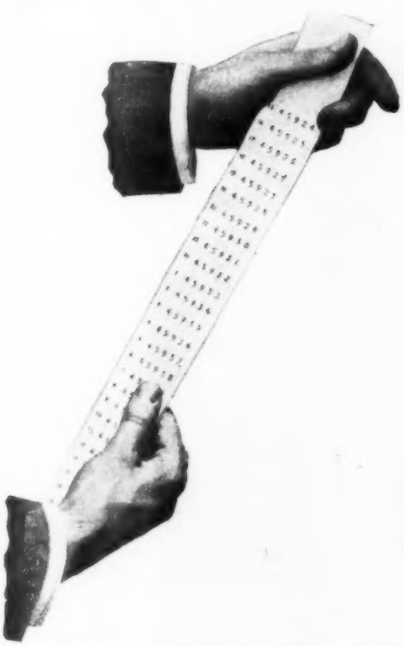
# INDUSTRIAL SECTION

ILLUSTRATED DESCRIPTIONS OF NEW AND STANDARD ELECTRICAL AND MECHANICAL APPARATUS

**The Chicago Method of Selling Power.**

The method of selling power to street railway and large industrial power customers, which has been developed in Chicago has attracted world-wide attention, because of the unprecedented success of the Chicago company in obtaining large power contracts. It is believed the largest deals for electric power ever made in the world are contracts held by this company.

This method has thus far been applied principally to the sale of power for street railway purposes, but has also in special cases been and is being applied to the sale of industrial power.



ONE DAY'S REGISTRATION, GIVING QUANTITY OF ELECTRICITY CONSUMED DURING EACH HOUR.

It consists of an annual demand or primary charge which covers all fixed charges on the investment in the portion of the central station system which is actually used by the particular consumer and which primary charge is based on the greatest one hour demand in the year. In addition to this demand charge there is an output or secondary charge at a fixed rate per kilowatt-hour to cover fuel, labor and other operating expenses and which charge is based on the total registration at the end of each month.

The correctness of such methods of charging based on actual cost of production has already been accepted by several public and municipal bodies and commissions. The Chicago method applied to street railway power measurement the past seven years has been developed and now is applied to the sale of power aggregating a maximum demand of over 80,000 kilowatts.

It is interesting to note how the current is metered to these large customers. At the beginning the integrating wattmeters were read by the operators at the end of each hour, then various graphic and other instruments were tried and because of the extreme accuracy required in the determination of the maximum demand for such large quantities of power the use of integrating wattmeters was continued. Efforts were then made to read these integrating wattmeters automatically, which finally resulted in the perfection of the Chicago printing attachment for wattmeters. This attachment can be applied to any high grade direct-current or alternating-current single or polyphase integrating wattmeter and prints in ordinary figures on a one and one-half-inch strip of paper the actual registration in kilowatt-hours at the end of every five minute or longer interval as may be desired. Such printed record is removed at the end of each day or week.

The printed registration slip shows the actual consumption during every five minute or longer interval from which can be immediately ascertained the particular hour of the day and day of the week when the maximum demand occurred. This maximum is not momentary but is the average for the five minute or longer period desired, as register by the integrating wattmeter.

The Chicago printing attachment is especially advantageous in the sale of electric power and particularly to the large consumers. By means of the continuous record it enables the central station or power company to know absolutely all the vital conditions and hence the cost of the energy which it supplies to a particular consumer and lends itself to the sale of power under different methods and conditions, and also the sale of off-peak power.

The Chicago printing attachment was originally developed and put on the market by the Chicago Electric Meter Company. This company was later absorbed by the Minerallac Electric Company, and the printing attachment added to its line of well-known products. The Minerallac Electric Company has worked steadily and cautiously to improve and perfect the device, and is now sending out a new bulletin describing several types applicable to the various requirements of metering.

The type A attachment was the first and simplest possible form, printing at one hour interval only.

Type B is similar to A, but with the added features of being adjustable to print at different intervals as five min-

VIEW OF THE CHICAGO PRINTING ATTACHMENT FOR POWER WATTMETERS.

utes, ten minutes, one-fourth hour, one-half hour and one hour, and also has automatic movement of the inking ribbon.

Type C shown in the illustration is a radical departure from the first two models in that it is not contained in the meter case, but is separately mounted either on the front or rear of the switchboard, or on a separate panel, and is electrically connected to the meter, thus leaving the meter case un-

changed, and its original register dial intact.

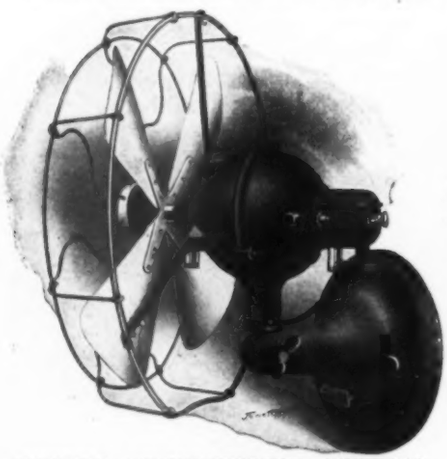
This type may be received by the customer, and installed without sending his meters to the factory, as is required by the previous types. This makes it possible to apply the printing attachment to the large series wattmeters on the switchboards where it is inconvenient or impossible to remove the meter from the board.

This type of attachment when mounted in a case complete with clock and relay is readily adapted to meters on customers' premises either for permanent installation or temporary testing purposes, and may be changed from one meter to another.

These printing attachments will be exhibited at the coming N. E. L. A. convention at St. Louis.

### An Oscillating Fan in Sixty Seconds.

It has been found that the person who contemplates buying an electric fan sometimes feels that he does not want to spend the extra amount required to get one that oscillates, and it is for this customer that the Sprague



LUNDELL DIRECT-CURRENT UNIVERSAL JOINT DESK AND BRACKET FAN WITH OSCILLATOR ATTACHED.

Electric universal-joint, non-oscillating fan has been designed. If, after a non-oscillating fan has been purchased, the customer finds that the oscillating type is more desirable he may obtain this by attaching a simple oscillator mechanism. Such a device may be purchased at any supply house.

The oscillator mechanism is very simple, and can be attached to the 1910 type of Lundell non-oscillating fan by any one in an incredibly short time. The change from one type to the other has been made in sixty seconds.

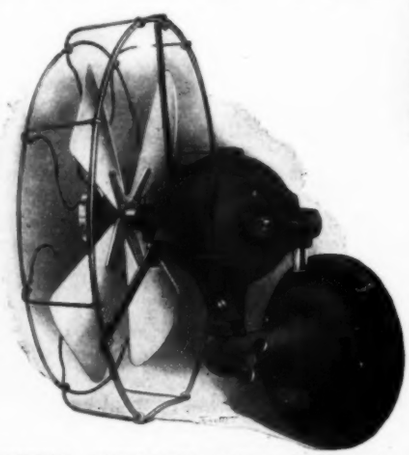
The accompanying illustrations show the oscillator mechanism and the Lundell fans with and without it. Printed instructions for attaching are placed

OSCILLATOR MECHANISM FOR LUNDELL DIRECT-CURRENT UNIVERSAL DESK AND BRACKET FANS.

in each package containing the mechanism.

### Industrial Exposition in Italy.

An international exhibition of industry will be held in Turin, Italy, from April to October, 1911, with the official participation of the United States. Exhibitions of appliances, machinery and inventions and commodities which are finding their way on the market will be given. The granting of floor space is in the hands of the International Exposition Bureau of New York.



LUNDELL DIRECT-CURRENT UNIVERSAL FAN WITHOUT OSCILLATOR MECHANISM ATTACHED.

### Australian Exhibition.

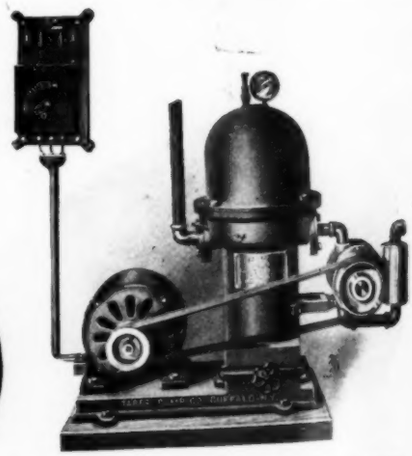
The annual exhibition of Australian manufacturers, under the auspices of the Australian Natives Association, opened in the Exhibition Building, Melbourne, February 1. Aside from the creditable exhibits of local manufactured articles, there were exhibited excellent specimens of American electrical goods, printing machines, etc.

### The Taber Electric Vacuum Cleaning Machine.

The electric vacuum cleaning machine, shown in the accompanying illustration, is designed to be placed in the basement or cellar of a house, school, church or other public building and to be connected to the upper floors by means of a stand pipe in a partition with openings on the several floors. From these openings are run flexible hose of sufficient length to reach all rooms. All dirt and dust are carried through this hose to an air-tight receptacle located in the machine in the basement where a simple arrangement has been made for its removal.

This machine is operated by an electric motor of sufficient horsepower to create a vacuum of at least ten inches. It is so constructed that no water is necessary to seal it or keep it cool. The machine may be started and stopped from each floor, if desired, thus obviating the necessity of going to the basement for that purpose.

The Taber electric vacuum cleaning machine is being manufactured and



VIEW OF THE STATIONARY TYPE TABER ELECTRIC VACUUM CLEANING MACHINE.

placed upon the market by the Taber Pump Company, Buffalo, N. Y. A full line of cleaner tools designed for cleaning all kinds of material is supplied with each machine.

### New Hisey-Wolf Factory.

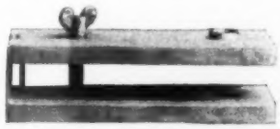
The Hisey-Wolf Machine Company, Cincinnati, O., is preparing plans for a new fire proof factory at the corner of Marshall and Colerain avenues. The growing demand for Hisey electric drills and grinders has made this extension necessary.

### Sun Motors Wanted.

Several persons residing in the Persian Gulf region have requested an American consul to furnish them the names of American concerns manufacturing an apparatus for utilizing the energy of the sun's rays for generating electricity. On account of the great amount and intensity of sunlight in that region such an apparatus would be exceptionally useful. If such a mechanism capable of running an electric fan and of storing up enough power to keep it going at night can be furnished at a moderate cost a great many sales could be effected. Such an apparatus might also be adapted to a variety of uses. The names of merchants with whom correspondence regarding this matter should be taken up are given in the report (File No. 4902, Bureau of Manufactures, Washington, D. C.).

### Ashland Boring Jig.

Contractors and electricians who are familiar with the annoyances encountered in boring holes in wooden cut-out boxes will be interested in the Ashland boring jig, shown in the accompanying illustration. This handy and useful device enables the user to cut clean holes and eliminates the possibility of gouging the box or the asbestos.



ASHLAND BORING JIG.

The device is made of hard wood, is reversible and can be used in either side. The steel sleeve takes an eleven-sixteenth inch bit on one side and a thirteen-sixteenth inch bit on the other side. As will be seen from the illustration the cradle in the rear end of the jig is held by a steel pin which runs through the wood. A thumb screw with a spring holds the device firmly against the cut-out box. The Ashland Electric Company, Chicago, which manufactures this device, claims that it will pay for itself on one job.

### Uniform Lamp Posts in Indianapolis.

The Board of Public Works of Indianapolis, Indiana, has made a ruling that all outdoor street lights erected for illuminating the downtown district must be uniform.

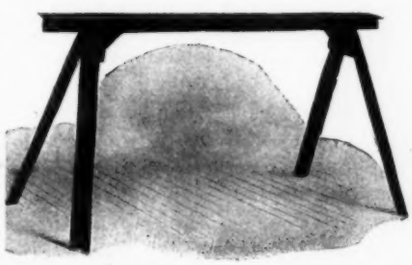
### New Magneto Switch.

The Connecticut Telephone and Electric Company, of Meriden, Conn., has placed upon the market a new type of automobile magneto switch which is fitted with a Yale lock so that when desired the ignition system may be locked in such a way as to make operation impossible. This switch also cannot be operated when the plug is removed, thereby practically making a double lock. It may be seen from the illustration that the lock is placed in such a position that it does not disfigure the switch in any way and a great deal of satisfaction can be assured to the owner that he is safe in leaving his car most anywhere, and he is also absolutely sure the car cannot be used when left in the garage.

CONNECTICUT MAGNETO SWITCH.

### Hildreth Collapsible Steel Trestle.

The two accompanying illustrations show the Hildreth collapsible steel trestle when ready for use and folded. This trestle is manufactured from steel angles in several heights and lengths. It is rigid and strong and when not in use can be folded for convenient storing or handling.



HILDRETH STEEL TRESTLE.

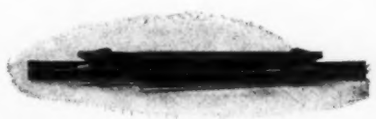
It is evident that this trestle will be of great convenience for use by contractors, painters, carpenters and others, and in manufacturing plants, stores, shops, etc.

The trestle is manufactured by the S. M. Hildreth Company, No. 2 Rector Street, New York, N. Y. The company states that this trestle will be offered in various sizes for different purposes, and that it can be made to raise and lower to various heights. It can also be furnished in special sizes for any particular requirement.

### Large Installation of Gas Engines.

The American Steel and Wire Company has just awarded contract to Allis-Chalmers Company for two gas engine blowing units for its central furnace plant at Cleveland, Ohio. These engines have a maximum capacity of five thousand horsepower each. This is the sixteenth consecutive order received from the steel corporation by the Allis-Chalmers Company and makes a total of fifty large gas engines sold by the company to this corporation.

Besides twenty-three gas-driven units installed at intervals during the past three years in its various plants, the Steel Corporation installed, at one time, twenty-five Allis-Chalmers gas engines of 4,000-horsepower each in the power houses of the Indiana Steel Company at Gary, Ind. Seventeen of these drive electric generators, and eight are used to operate blowing cylinders. Since they were first started up, the records of the engines have been carefully watched, both by the engineers of the Steel Corporation and by gas power experts, with the result that successive purchases of units of the same build are now being made.



HILDRETH TRESTLE FOLDED.

The engines ordered by the American Steel and Wire Company, which will make seven in operation at its plants, are of the twin-tandem double-acting, four-cycle, horizontal type with gas cylinders forty-four inches in diameter and sixty-inch stroke. They will operate on blast furnace gas. The blowing tubs are of the Slick type and are eighty inches in diameter.

### High-Efficiency Carbon Lamps.

The National Electric Lamp Association, through its department of publicity, has issued a bulletin giving some important and interesting data on high-efficiency carbon lamps.

Beginning with May 1, all regular carbon lamps will be designated by wattage instead of candlepower as previously has been the case with all other types of Gem metallized filament, tantalum and Mazda (tungsten filament) lamps.

All styles of lamps will, after the above date, be labeled with the three-voltage label and the regular type of sixteen-candlepower carbon lamp, in such general use, will be made hereafter on the basis of 3.1 watts per candle at top voltage as shown by the table.

| Nominal watts | Voltage | Actual watts per candle | Actual watts | Actual candle-power | Hours life |
|---|---|---|---|---|---|
| 10 | ..... | 5.00 | 10 | 2.0 | 2,000 |
| 20 | ..... | 4.15 | 20 | 4.8 | 2,000 |
| 25 | Top | 3.10 | 25.0 | 8.1 | 500 |
| | Middle | 3.31 | 24.1 | 7.3 | 725 |
| | Bottom | 3.52 | 23.2 | 6.6 | 1,050 |
| 30 | Top | 3.23 | 30.0 | 9.3 | 1,050 |
| | Middle | 3.46 | 28.9 | 8.4 | 1,500 |
| | Bottom | 3.69 | 27.8 | 7.5 | 2,100 |
| 50 | Top | 2.97 | 50.0 | 16.8 | 700 |
| | Middle | 3.18 | 48.2 | 15.2 | 1,000 |
| | Bottom | 3.39 | 46.4 | 13.7 | 1,500 |
| 60 | Top | 2.97 | 60.0 | 20.2 | 700 |
| | Middle | 3.18 | 57.9 | 18.3 | 1,000 |
| | Bottom | 3.39 | 55.7 | 16.4 | 1,500 |
| 100 | Top | 2.97 | 100.0 | 33.6 | 600 |
| | Middle | 3.18 | 96.4 | 30.5 | 850 |
| | Bottom | 3.39 | 92.9 | 27.4 | 1,350 |
| 120 | Top | 2.97 | 120.0 | 40.4 | 600 |
| | Middle | 3.18 | 115.8 | 36.6 | 850 |
| | Bottom | 3.39 | 111.4 | 32.8 | 1,350 |

The fifty and sixty-watt sizes correspond respectively to the old sixteen-candlepower, 3.1-watts-per-candle lamp (at top voltage) and the old sixteen-candlepower, 3.5-watts-per-candle lamp (at bottom voltage). Similarly all lamps including the carbon which are listed on the three-voltage basis operate at highest efficiency at top voltage.

As noted from the table, the only two regular carbon lamps (100 to 130 volts) not listed on the three-voltage system are the ten and twenty-watt sizes.

The candlepower given is based upon the new International candlepower by which a lamp formerly giving sixteen candlepower will now be rated at 16.26 candlepower. The actual watts per candle are likewise based upon the new standard so that the listed values correspond to old values, as for example, the fifty-watt, top-voltage, 2.97-watts-per-candle lamp listed at 16.8 candlepower, is the former sixteen candlepower, 3.1-watts-per-candle lamp.

The sixty-watt, bottom-voltage, 3.39-watts-per-candle lamp listed at 16.4 candlepower is the old sixteen-candlepower, 3.5-watts-per-candle lamp.

The hours life of all of the listed carbon lamps shows the total life and not the useful life or that formerly given as to eighty per cent of initial candlepower. This value brings the life of the lamp nearer to the basis which has been accepted by the lamp user.

Lamps are usually left upon the circuits until dim or burned out, which is long after the useful (or eighty per cent of initial candlepower) point of burning has been reached. For this reason it is argued that for the central station it is a much better proposition to use a higher efficiency carbon lamp, (having at least a 700-hour life) with which to renew than to leave the old style low efficiency lamp upon the circuit to cause dissatisfaction. If this lamp were shorter lived the renewal expense would be too greatly increased to warrant a change.

It is desired to bring to the attention of the central station man the fact that if he does not feel in a position to take up the Mazda lamp for general use, the new list of carbon lamps offers two alternatives. Both of these, it is felt, will place the service of any central station which is using the old 3.5-watts-per-candle carbon lamp, upon a better paying basis.

A fifty-watt top-voltage lamp at the same price as the old style sixteen-candlepower lamp will deliver a light of better color value than the lower efficiency lamp. Low-voltage and small feeders are not at fault in most cases where poor light is delivered, but where they are, the use of a lamp of less wattage such as the fifty-watt top-voltage lamp would tend to improve. Lamps of this type will slightly lower the load, it is true, but will deliver a better light than is now prevalent, if properly renewed, after a satisfactory average life of 700 hours.

The sixty-watt lamp (top voltage) would appear to meet conditions better than the fifty-watt (top voltage) lamp. Not only does the former give twenty-five per cent more light than the old style sixteen-candlepower, 3.5-watts-per-candle lamp, but the increase of four watts per lamp would warrant use on central-station circuits where the rates do not permit of the use of the Mazda lamp. The use of this lamp would improve the quality and quantity of light delivered to the consumer and would warrant the slight increase in cost of operation to the consumer. For a period of 1,500 hours the use of the top-voltage sixty-watt lamp would pay its extra renewal cost over the bottom-voltage sixty-watt (or old style sixteen-candlepower, 3.5-watts-per-candle) lamp on costs of power as low as four and one-half cents per kilowatt-hour.

### Cutler-Hammer Company to Manufacture Kohler-System Controllers.

Of interest to the electrical trade is an announcement just made concerning the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., makers of electric controlling devices, and Kohler Brothers, Chicago, Ill., contracting electrical engineers and owners of the patents covering the Kohler-system, automatic, push-button control for printing presses, motor-driven tools, etc.

An arrangement has been made by the two companies in question whereby the Cutler-Hammer Manufacturing Company will hereafter manufacture and market for Kohler Brothers, in the United States and Canada, the various types of push-button-operated controllers comprised in the Kohler system of control. For the purpose of carrying this arrangement into effect, all data, records, etc., pertaining to the Kohler system have been transferred to the Cutler-Hammer Company.

It is announced by the Cutler-Hammer Company that the company has retained the services of the men who have been handling this branch of Kohler Brothers' business, thus insuring a continuance of expert supervision by engineers thoroughly familiar with the Kohler-system control and its application to printing presses and other classes of motor-driven machinery.

Formal notice to the trade embodying the facts above stated will be issued shortly by the two companies concerned.

The Postal Telegraph Cable Company has announced that on June 1 it will make substantial increases in the wages of its telegraph operators in all important offices of its system. These offices are to be classified according to their comparative importance.

The increases will be selective, and will run from five—and in some cases as high as twenty-five—per cent.

# Current Electrical News

## GREAT BRITAIN.

*(Special Correspondence.)*

LONDON, APRIL 30.—The supply of electricity to small towns has occupied the attention of many people for several years, but no one can be said to have made a conspicuous success of it. Of course, the house-wiring problem is a serious factor in this result, and probably until private houses are wired by the builder, as is at present the case with gas, complete success will not be achieved. But there are other equally important details, such as the cost of securing parliamentary powers for erecting electricity works, and the almost universal prejudice of local authorities to overhead wires, all of which tend to keep up the selling price. A new company has recently been formed, however, which will depart from the stereotyped lines upon which supply in small towns has hitherto been given. There is a very considerable number of such places where, for the reasons given above, and for other reasons, the likelihood of any supply at all being given under present conditions is very remote. This company therefore proposes to adopt the simple expedient of dispensing altogether with parliamentary powers and to run its undertakings by agreements with the various councils. One of the conditions is to be the use of overhead wires. This is one way of dealing with these small towns. On the other hand, the local gas companies are being advised by consulting electrical engineers, that they have at hand the facilities for successfully running a small electric lighting plant, using gas engines, and reducing capital and maintenance charges to the minimum by, on the one hand, erecting the plant on the gas works site—where there is usually surplus land—and on the other hand, by using the gas staff, as far as possible, for the electrical undertaking. Already one very successful undertaking of this character has been put into operation and two others were sanctioned this week. In either case it opens up the prospect of electricity supply in small places which otherwise stand very little chance in getting it.

It is stated that a second telephone cable, with loading coils, is to be laid across the English Channel, to augment present means of communicating with the continent.

An interesting, and perhaps exciting, evening is promised toward the end of May, when a discussion on the merits of tariff reform and free trade in relation to the electrical industry is to take place. The meeting has been convened by the National Electrical Manufacturers' Association, which, however, is careful to announce that it takes no responsibility for the views of speakers. The free-trade champion is to be J. H. Kingsbury, who recently resigned the managership of the London branch of the Western Electric Company, while Hugo Hirst, of the English General Electric Company, will lead the tariff reformers.

There are now 260 licensed wireless-telegraph stations in the United Kingdom. The large proportion of 241 are for experimental purposes, fifty-eight being in the county of London. In addition, thirty-two ship owners hold licenses covering 116 ships.

S. Z. de Ferranti has been nominated as the new president of the Institution of Electrical Engineers. Mr. Ferranti, who is very popular with all members of the institution, was put forward by the Manchester Section, which now constitutes the most important branch.

An interesting paper was read last night at the Institution of Electrical Engineers on the question of grounding the neutral of three-phase systems in collieries. While the author advocated insulating, and cited some American practice to support his contention, every speaker in the discussion was in favor of grounding. I understand that the Institution of Electrical Engineers has been preparing evidence to be placed before the Home Office committee now dealing with the use of electricity in mines, and the official view which it put forward is in favor of compulsory earthing of the neutral with armored cables. G.

## CONTINENTAL EUROPE.

*(Special Correspondence.)*

PARIS, APRIL 28.—In Luxembourg a syndicate has been formed for the co-operation of a number of prominent banking houses and industrial firms for the purpose of promoting an electric power supply enterprise. According to the present plan, there will be erected an extensive network of overhead lines so as to cover especially the industrial regions of the country. Power supply for large motors is the especial aim of the syndicate. Several hydraulic plants in different regions may be erected so as to feed into the network, commencing with the turbine plant which will likely be built near Boulaide, on the Sure River.

On the channel coast of France there is to be run an electric railroad which will connect the localities of Wimereaux, Wissant and Guinness and neighboring communes. In the south of France a project is on foot for an interurban traction line on the trolley system which will be run from the town of Limoges to Grossereix and Bessiner. It is to have a branch line running to St. Sornin. Three new sections of city tramways are planned for Turin, Italy, and among other traction projects I note a tramway line which the Austrian Siemens-Schuchert Company is to install in the commune of Klagenfurt.

Current for industrial motors is to be secured in the Jura region of France and Switzerland by a hydraulic plant which will be erected on the Bienne River near the commune of Morez. Work on the hydraulic part of the enterprise is soon to be carried out. In Algeria, the town of Boukanfis has advertised for bids for an electric lighting plant. It is stated that there is an extensive project on foot in the Rhine region of Germany, for a turbine station and that the sum of $3,000,000 has already been raised for that purpose. The communes of Friedeck and Gablonz are taking measures to erect lighting stations for local use. At Foscani, Roumania, the contract will shortly be awarded for electric lighting. The Union Gesellschaft is undertaking the construction of a central station for the town of Rochlitz, Bohemia, which will be run on the three-wire 220-volt system.

Workmen's protective devices will be awarded various prizes at the international concourse which is to be held by the Italian Government. Among others I note an apparatus which is needed for belting machines while they are running. A prize of $2,000 will be given for theoretical and experimental work on grounding of lines. A. DE C.

## EASTERN CANADA.

*(Special Correspondence.)*

OTTAWA, MAY 7.—The first business of the Public Utilities Commission, recently appointed by the government of New Brunswick province, will be the investigation into the telephone companies of the province, which are charged with boosting rates to pay dividends on watered stock.

A cofferdam over the mouth of the Beauharnois Canal, Que., is being built preparatory to letting out the water and deepening the canal. The new power plant at St. Timothy will demand a large supply of water, and the capacity of the canal is not sufficient.

Before the final passage of the Canadian Light and Power Company's bill, in the Quebec legislature, an amendment was incorporated in it declaring that any rights to amalgamate with other companies should not apply to the Montreal Light, Heat and Power Company, or affiliated companies.

The Canadian General Electric Company, of Toronto, will issue 9,400 shares of common stock to shareholders, at par, in proportion of one to five payments to be made in ten equal installments. This will bring the company's capital, paid up, to $8,000,000. The move is needed to finance extensions to the company's plant at Peterboro, Ont.

The Mexican Light and Power Company will soon be able to make a better showing than it did in the month of March, as the steam plant is still in use to a certain extent. After this year's wet season, which should commence about the end of the month, it is anticipated that the steam plant will be closed down for good, as the storage plant has been increased to a very large extent.

According to a statement made before the recent meeting of the Canadian Society of Civil Engineers, held in Toronto, electric traction is easily within the range of probability, in the near future, in such centers in Canada as Toronto and Montreal, where hydro-electric energy is abundant, or soon will be. It was pointed out that a stage has arrived in the increase of railway traffic, when grade crossings became intolerable, and the risk and interruption due to them became more expensive than their elimination.

The Toronto street railway management and the employes of the company have been quietly preparing for the arbitration which, it is expected, will soon begin after the men formulate their demands, relative to the conditions of employment on the system. It will be three years in June next since the last settlement was effected, and that settlement provided for arbitration as the means of arranging all differences that might arise, in event of disagreement. The employes will probably ask that the wages be for first year men at the rate of twenty-six cents per hour; for men in the second year and up to four years, twenty-eight cents, and for four year men or over, thirty cents per hour. The present maximum is twenty three and one-half cents per hour. W.

## IMPORTANT DEVELOPMENTS.

*(Special Correspondence.)*

TO SUPPLY POWER TO MINES.—One of the features of the development of the country through which the new Gulf-to-Sound line will run is a 4,000-horsepower electric plant. This will supply power to copper mines in the vicinity of Shoshone, Wyo. The dam,

which is being built across Wind River by the Asmus-Boyesen Company, of Chicago, is to be used in connection with this plant and will at the same time serve as a viaduct for the Burlington tracks.

HYDROELECTRIC PLANT IN WYOMING.—The plans of the North Platte Irrigation Company for a new power house involve the expenditure of $400,000. The power house will be located a mile below the North Platte company's reservoir on the La Prele, and the fall from the reservoir will be used to generate electrical power. About 6,000 horsepower will be generated and transmitted to the neighboring towns. Electricity from the plant will be supplied to consumers in Douglas, Wyo., and to irrigators along the Platte River for use in pumping water from the river to their lands.

MORE NORTH CAROLINA POWER PLANTS.—There appears to be ample grounds for the report that the Duke interests, controlling the Southern Power Company, will purchase some 50,000 acres in the famous resort country known as "Toxaway," and that they will build several additional hydroelectric plants in the mountains near Hendersonville and Brevard, N. C., and dispose of the same over the Carolina state line in South Carolina, and also to industries which they hope to attract to the site of the new power plants. It is stated furthermore that the Duke interests have an option on about fifty thousand acres in the Toxaway country, including the chain of resort hotels, and that these will be maintained as heretofore, but the primary object is waterpower development. With an independent concern working out a plan to reach Asheville by electric lines from Gastonia, N. C., and the possibility of the Dukes not only extending their electric lines through the Piedmont from Greenville, S. C., to Greensboro, N. C., 200 miles, and developing 30,000 horsepower in the mountains southeast of Asheville, about Toxaway, the outlook for the development of the mountain country is bright. The completing of the surveys on the line from Anderson to Greenville to Spartanburg, already decided upon for interurban development, shows a twenty-three-mile stretch from Anderson to Greenville and a thirty-five-mile stretch from Spartanburg to Greenville. For the line farther north than Spartanburg no definite plans have been made or announcements given out. L.

## LIGHTING AND POWER.

*(Special Correspondence.)*

EMMETSBURG, IOWA.—The Postville Light and Heat Company, has been incorporated with a capital of $25,000.

SYLVANIA, GA.—The town will shortly vote on a $30,000 bond issue for a municipal electric lighting plant, waterworks and sewerage. L.

LOS ANGELES, CAL.—The capacity of the Johnnie Mining and Milling Company will be increased by the installation of electric power. A.

LA CROSSE, WIS.—The La Crosse Water Power Company let the contract for the installation of another unit to the S. Morgan Smith Company. C.

STILLWATER, MINN.—The Consumers' Power Company is installing an auxiliary steam plant, including two 350-horsepower Stirling boilers. C.

NORTHFIELD, MINN.—The new managers of the Northfield Light Heat and Power Company, are planning many improvements in their system. C.

BISMARK, N. D.—An additional building will be erected at the city electric light plant to accommodate a cross-compound engine and dynamo.

FOUNTAIN, MINN.—O. H. Case has been surveying for the contruction of a dam by Messrs. Ober & Comstock, of Chatfield, Minn., and others. C.

BRUNNER, TEXAS.—The Brunner Water and Light Company has awarded the contract for the installation of an electric light plant here to D. D. Pitman. D.

CHIHUAHUA, MEXICO.—The Greene Gold and Silver Mining Company is preparing to install an electric power plant at its Durazno mine, situated in this state. D.

TEMPE, ARIZ.—A bill has been introduced at Washington, authorizing Tempe to issue $30,000 worth of bonds, for the purpose of installing a municipal lighting system. A.

ODESSA, WASH.—M. C. Osburn, connected with the Washington Water and Power Company, announces that an electric light and power system will soon be installed here by his company. A.

HEMPSTEAD, TEXAS.—The Hempstead Light and Power Company has been organized here with a capital stock of $10,000. J. D. Harvey, Paul Grieg, G. S. Osborne and others are incorporators of the company. D.

ATLANTA, GA.—The South Atlantic Contracting and Constructing Company with a capital stock of $15,000 has been incorporated by Maurice W. Thomas, H. N. Randolph and Hugh M. Scott. B.

LOMETA, TEXAS.—The water works and electric light plant here have been purchased by E. H. Gordon of Coperas Cove, Texas, from Messrs. Monts & Son. The new owner will make improvements. D.

MERRIL, WIS.—The Merril Railway and Lighting Company has taken over all the electric light customers of the H. W. Wright Lumber Company and also purchased a large amount of wires and poles from the lumber company. M.

ROCKFORD, ILL.—Work is progressing rapidly on the new plant of the Rockford Electric Company. Workmen are installing a 400-horsepower engine at present and the concrete roof of the engine room is nearly completed.

MILLEDGEVILLE, GA.—The Milledgeville Brick Works, of which J. W. McMillan is proprietor, is installing a modern electric drying apparatus. It is reported that other electrical improvements and additions may be made at this plant. B.

BESSEMER, ALA.—It is understood that the Sloss-Sheffield Steel and Iron Company will at once begin installing an electric system at its mines in Bessemer, the whole mines to have the new system for lighting, hauling, pumping, etc.

DUBLIN, GA.—The Pratt Engineering and Machinery Company of Atlanta, Ga., has a contract from the Consolidated Phosphate Company for engineering machinery and construction of an acid-phosphate plant to be electrically operated.

NELSON, B. C.—The International Electric Company has been incorporated with a capital stock of $1,000,000. The object of the Company is to develop hydroelectric power from the falls at the junction of the Salmon and Pend Oreille rivers. A.

KITTANNING, PA.—The power house of the Kittanning Electric Light Company and the Kittanning and Lechburg Street Railways Company, a brick building covering an entire block, was destroyed by fire a short time ago. The loss is estimated at $200,000.

CARTHAGE, IND.—The plant of the Light, Heat and Power Sompany, of this city, was recently purchased by Fred F. Brenan, of Parkersburg, W. Va. Mr. Brenan took charge of the property on May 1. A gas engine is to be intsalled to furnish power.

SAN BERNARDINO, CAL.—C. H. Burlock of San Diego, will put in operation the Victor-Virgin power plant at Needles, which for several years has not been in use. Electric current will be transmitted to the Mossack Mines in the San Francisco mining district. A.

VALDOSTA, GA.—The Consolidated Ice and Power Company, of Valdosta, Ga., will in a short time begin the work of erecting a new power and lighting plant. A greater portion of equipment, machinery, etc., will be new although much of the old stuff can be used. B.

BEAR CREEK, ALA.—N. W. Benefield and associates who plan the establishment of a hydroelectric plant, have not, it is stated, as yet purchased machinery nor engaged an engineer. Mr. Benefield wishes prices and data on electrical machinery for the water-power plant. B.

WILKESBARRE, PA.—At a recent meeting the directors of the Wilkesbarre Gas and Electric Company decided to approve an appropriation of $100,000, which is to be spent in improvements and extensions in their electric and gas plants. Work will be started at once.

GADSDEN, ALA.—Articles of incorporation of the Neccalula Railway, Light and Power Company were prepared a short time ago. The capital stock of the company will be between $300,000 and $500,000. H. A. Rodgers, one of the chief promoters, will probably be president.

LOS ANGELES, CAL.—Seventh street from Hoover to Boyle, a distance of four miles, and to Sixth street from Main to Alameda streets, will have an ornamental street-lighting system. The property owners will pay for the ornamental post and electric current on alternate years. A.

TEPIC, MEXICO.—A. R. Springer and associates will install a hydroelectric plant in the territory of Tepic for the purpose of supplying mines and other industries with power. The water of the Acosta and Chichicaste arroyos will be used for the purpose of operating the plant. D.

MANTON, CAL.—It is expected that the Northern California Power Company's new steam shovel, installed at the Ripley Creek plant to work down the ditch, will finish 200 feet of ditch a day. All the tunnels for the Inskip power house have been completed and the plant will be in operation about June 15. A.

CHIHUAHUA, MEXICO.—The Sierra Mining Company will install a hydroelectric plant at its mines in this state. Robert Linton, representing the company, recently applied to the federal government for a concession to use the water of the Navosaigame River for the purpose of operating the proposed plant. D.

MISSOURI VALLEY, IOWA.—The Missouri Valley Electric Light Company has just installed a 500-kilowatt Westinghouse turbine generator set for furnishing local light and power. The turbine is of the complete expansion type, utilizing steam at 125 pounds and exhausting into a vacuum of twenty-eight inches.

SANDUSKY, OHIO.—At a recent meeting of the Sandusky Gas and Electric Company the following officers were elected: President, B. Mahler; vice-president, C. B. Wilcox; secretary and treasurer, A. Lowenthal; general manager, Emil A. Bechstein. These with E. H. Moore and Louis Hexter were re-elected directors. H.

LOS ANGELES, CAL.—An ordinance has been passed calling

for bids for the furnishing of electric current for a period beginning August 14, 1910, and ending June 30, 1912; also for furnishing tungsten lamps and necessary appliances for ornamental cast iron lighting posts, located on Fourth Avenue from Main to Hill Streets. A.

FARGO, N. D.—The Union Light, Heat and Power Company, valued at $500,000, and owned by Paul Doty, J. J. Hill and other St. Paul capitalists, was sold recently to Byllesby & Company, of Chicago, who are proprietors of a large number of similar plants in the West. The local company furnishes gas and electric light and power.

BLACK RIVER FALLS, WIS.—The contract for the equipment of the new power plant has been awarded to the Power Equipment Company, of Minneapolis, Minn., for $4,000, and the installation of the generator and switchboard to the Fort Wayne Electric Company, of Fort Wayne, Ind., for $5,000. A power house will be built at a cost of $3,500.

SULLIVAN, IND.—The city council has granted a twenty-five years franchise to the Sullivan Electric Company to light the city. The rate is the same as under the old contract $60 a year for each lamp. In consideration of the franchise the company agrees to expend at once $10,400 in repairs and install some new machinery and meters for all incandescents. S.

SAN FRANCISCO, CAL.—N. W. Harris and Company have purchased the $2,000,000 first mortgage five per cent bonds of the Pacific Coast Power Company, which, in addition to owning water rights near Seattle and Tacoma capable of developing 80,000 horsepower, owns a large majority of the common stocks of the Seattle Electric Company and the Seattle-Tacoma Power Company. A.

MINNEAPOLIS, MINN.—The first 1,000-kilowatt high pressure turbine generator unit in the new 5,000-kilowatt power plant of the Pillsbury Flour Mills Company has been contracted for with the Westinghouse Machine Company, East Pittsburg, Pa. The turbine element is supplied with steam at 175 pounds pressure and exhausts into a vacuum of twenty-eight to twenty-nine inches.

RAPID CITY, S. D.—The Dakota Light and Power Company let the contract for the construction of a sub-station at Riverside. Work has been started on the construction of a power house at Big Head, on Rapid Creek, to cost $18,000, and the contract let to the Missouri Valley Engineering and Construction Company, for the erection and completion of the hydroelectric machinery there. C.

MEMPHIS, TENN.—Incorporation has been effected by the Nolachuckey Power Company, of Erwin, for the purpose of building a hydroelectric plant at the Devil's Looking Glass, on the Nolachuckey River, near Erwin. It will develop about 2,500 horsepower, a goodly portion of which will be consumed in operating a cotton factory which O. P. Heath & Company, of Charlotte, N. C., will build at Erwin.

CLEARFIELD, PENN.—The Central Pennsylvania Light and Power Company has awarded a contract to Allis-Chalmers Company for a new generator. This is the second generator bought of the same company within three months. The present machine is a 400-kilovolt-ampere, 2,300-volt, three-phase, sixty-cycle alternator and will be direct connected to an engine. A twenty-two-kilowatt exciter is also included in the order.

MACON, GA.—The Macon Railway and Light Company has instituted suit against the city of Macon for $13,000 for lighting expenses alleged to be due the company, which has charged this sum against the city. The company discovered, it is said, a considerable sum charged against it by the city for franchise taxes, when it attempted to collect the lighting account. The present suit, it is added, is against the payment of the franchise tax. L.

ENCARNACION, STATE OF HIDALGO.—Robert S. Towne and associates who own the Flojonales copper mines near here are arranging to erect a hydroelectric plant on the Ixmiquilpan River. The plant will have a capacity of 20,000 horsepower and in addition to providing power for the mines and mill of the syndicate it will be used to operate an electric railway that Mr. Towne and associates are planning to build at Sayula, a station on the National Railways of Mexico. D.

BRISTOL, TENNESSEE.—The Doe River Light and Power Company, has let a contract to the Lowe Construction Company, of Bristol for the construction of a dam across Watauga River at Horseshoe Bend, Carter County, Tenn., to cost $250,000; the dam to be completed in twelve months. The Doe River Light and Power Company is under contract to furnish electric current for the Bristol Gas and Electric Company, to be sold in Bristol and thereabouts for manufacturing purposes. B.

PORT TOWNSEND, WASH.—The Olympic Power and Development Company has been incorporated by W. B. Martin, J. H. Carsten and J. A. Calvert of Seattle, E. A. Sims of Port Townsend, and E. W. Holander of Everett, the capital stock being $250,000. Three streams that this company intends to harness for the development of water power for the generation of electricity are the Quicome, the Dungoness and the Docewallips Rivers, all within the boundaries of the Olympic forest reserve. A.

TEZIUTLAN, STATE OF PUEBLA, MEXICO.—The new copper smelter of the Teziutlan Copper Mining and Smelting Company which has just been finished will be operated by a 3,000-horsepower hydroelectric plant, installed by the company a few miles from the mining camp. This company will soon begin the erection of another hydroelectric plant near its Ocotes copper mine, in the state of Oaxaca. The latter plant will be located on the Sola River and will be of 1,400-horsepower. D.

SALT LAKE CITY, UTAH.—The work of replacing the poles carrying the high power transmission lines of the Utah Light and Railway Company between this city and Ogden, with sixty-foot steel towers, will, it is reported, be started just as soon as the materials can be received. The company also intends placing within the next few days an order for twenty-four new passenger cars, twelve for use in the city, and the balance of the latest interurban type for service on the runs to Midvale, Sandy, Murray and Lovendale.

ANNISTON, ALA.—A large amount of building material has been received by the Anniston Electric and Gas Company, preparatory to the installation of larger generator of electric power. The electric plant is to be enlarged throughout. Associated with the Anniston Electric and Gas Company is the Alabama Power Development Company of which R. W. Mitchell is president, which company is building a high tension line between Anniston and Talladega for transmission of power between the two towns and intermediate places. B.

CHARLOTTE, N. C.—The report has been verified at the local offices of the Southern Power Company that the second of the three auxiliary steam generator plants to be built will be located at Greensboro, N. C. There has been much speculation relative to the location of the remaining two plants, the first having been located at Greenville, S. C. Each of the three plants will have a capacity of 10,000 horsepower, and will represent a large outlay. The third plant has not been located but there is a possibility that it will be put up at Charlotte. L.

PAULS VALLEY, OKLA.—The Washita Power Company has begun the repair on the concrete wings to the electric powerhouse across the Washita River at this place and will use all possible haste in putting in the new work so as to prevent another wash-out. A short time ago a twelve-foot rise came down the river and washed out one wing of the dam and made a new channel 100 feet wide around the powerhouse. The damage is estimated at $10,000. The power plant had just been completed and the power turned on when the break came. Pauls Valley has secured several important factories as a result of the cheap power.

PORTLAND, ME.—The Portland Electric Company has bought the properties at Bonny Eagle and Limington Falls, owned for several years by the Publishers' Paper Company. The development of the waterpower there will be by means of a dam at Bonny Eagle, and the power will be transmitted to Portland and disposed of for illuminating and manufacturing purposes. With the erection of the dam, sixty feet from the bed of the stream, a rough estimate has placed the total cost around a million. The Portland Electric Company is the holding company, the Consolidated and Portland Electric Light and Power Companies being subsidiaries.

COLCHESTER, CONN.—At a special meeting of the stockholders of the Colchester Electric Company the sale of the company to interests identified with the T. M. Russell Engineering and Supply Company of Middletown was authorized. A new board of directors, consisting of T. Macdonough Russell, Thomas Chantler, W. L. Whitney, Charles R. Baker and Gustaf B. Carlson, all of Middletown, was chosen. The board organized with the election of Mr. Russell as president, Mr. Baker as secretary and Mr. Whitney as treasurer and general manager. The stockholders, at the instance of the new owners, voted to reduce the capital stock of the company from $25,000 to $6,500. The concern will hereafer be operated mainly from the office of the T. M. Russell Engineering and Supply Company of Middletown.

BEAUMONT, TEXAS.—I. D. Polk, of Beaumont, has applied to the city council here for a franchise for fiffty years to use several of the streets and alleys for the operation of an electric street railways system, and also for a franchise to install an electric light and power plant. Associated with Mr. Polk in the project is L. D. Ross of New York and a number of other Eastern men. It is reported that John W. Gates of Port Arthur is also interested in the proposition which also embraces the construction of an interurban electric railway between Beaumont and Port Arthur. The survey for the proposed interurban line has been made. Mr. Gates is largely interested in the growth and development of Port Arthur, which has a population of about 10,000 people. As soon as the franchise is granted by this city the company will be organized to carry out the project. D.

GAINESVILLE, GA.—At an auction in this city on May 2 the entire properties and holdings of the North Georgia Electric Company were disposed of to S. F. Smith, of York, Pa., the plant netting $400,000. Two years ago the Knickerbocker Trust Company, of New York, brought foreclosure proceedings, and the sale by Receiver H. H. Dean was the result of this. The sale included the Dunlap plant and transmission lines to Atlanta and the Tallulah Falls property. It is reported that the property will be taken in hand by the Georgia Power Company and completely reorganized. The Georgia Power Company not long ago secured the necessary permission from the state to issue $6,000,000 bonds and several millions in capital stock, the bond proceeds to be used to take over the old plant and the remainder to raise cash to improve the plant and properties. L.

## ELECTRIC RAILWAYS.

*(Special Correspondence.)*

IOWA CITY, IOWA.—The Rundell Land and Improvement Company is arranging to let the contract for the construction of the city electric line. C.

MOSINEE, WIS.—The Wausau Street Railway Company has purchased a site for the construction of a power plant to develop 7,000 horsepower.

SEATTLE, WASH.—Felt & Eastman have the contract for the construction of the proposed Seattle-Tacoma Short Line and work will be started May 15. C.

CLIFFSIDE, N. C.—A survey is being made for a proposed trolley line to connect Forest City and Cliffside, and later to be extended to Gaffney, S. C. L.

MILTON, ORE.—The Walla Walla Valley Electric Railway has been granted a franchise to construct an electric railway in certain streets in the city of Milton. A.

VIRGINIA, MINN.—It is expected that work will shortly be commenced on the construction of a street car line. Mr. Prindle, of Duluth Minn., has the franchise.

RIVERSIDE, CAL.—J. S. Jackson has applied for a forty-nine year franchise for a single track railway over the roads and highways of the County of Riverside. A.

SPRINGFIELD, ORE.—The City Council has accepted the bonds of the Lane County Asset Company, to build an electric line into this city within twenty-four months. A.

SPARTA, WIS.—The bond issue of the Sparta-Melrose Electric Railroad Company having been declared valid it it expected that construction on the road will be started shortly. C.

GOLDENDALE, WASH.—The Maryhill & Goldendale Railway Company has been incorporated by S. Hill, H. C. Richardson and N. D. Miller, with a capital stock of $10,000. A.

SACRAMENTO, CAL.—The Elmhurst Street Railway Company has been incorporated by H. J. Goethe, H. A. McClelland, C. M. Goethe and G. P. Beere with a capital stock of $100,000. A.

BIRMINGHAM, ALA.—The Birmingham Railway, Light and Power Company has made formal application to city council for franchise for line it is to build from Ensley to the new industrial city of Corey, Ala. B.

MINNEAPOLIS, MINN.—Earl D. Luce, president of the Electric Short Line, states that construction on the line to Medicine Lake, about nine miles, will be rushed and that cars will be running into the city by next fall. C.

CHEHALIS, WASH.—The Twin City Light and Traction Company let the contract to the Coal Creek Lumber Company for the erection of a powerhouse to cost $75,000. The traction company will install turbine engines. C.

SIOUX CITY, IOWA.—The Omaha, Council Bluffs and Sioux City Electric Railway Company, J. A. W. Russell, secretary, has been incorporated to construct an electric line to Omaha, via Beebetown, Magnolia, Logan and Little Sioux.

IOLA, KAN.—A charter has been granted to the Oswego, Columbus and Cherryvale Electric Railway Company, capitalized at $50,000. The company headquarters is located at Oswego. The plan is to build an electric road from Columbus to Cherryvale.

SIOUX CITY, IOWA.—W. H. Miller, who originated the Des Moines-Sioux City interurban, is promoting a line from Council Bluffs, by way of Beetown, Logan, Magnolia, Little Sioux, Onama, Owego and Luton and into Sioux City through Morningside. C.

ROCHESTER, IND.—The project to build an interurban road from Wabash to Rochester has been revived. The Winona Interurban Company has taken the matter in hand and will build the road if the people will vote the same subsidies voted to the old company.

DECATUR, IND.—The Ft. Wayne and Springfield electric railway has decided to extend its line to Portland and Union City and will use old roadbed that was built more than forty years ago. It is well preserved and will save much expense when compared to a new grade. S.

GODSHEN, ALA.—This city has granted a franchise to Harry A. Rodgers, promoter of the Noccalula Railway, Light and Power Company. Work is to begin imediately and the promoters must furnish the city with a certified check for $1,500, as a guarantee that the road will be built.

MORGANTOWN, W. VA.—The Union Utilities Company will dispose of sufficient bonds by July 1 to extend the Sabraton railway to Dellslow and the Morgantown and Pittsburg Railway to Granville. The arrangements for securing the necessary funds, amounting to between $30,00 and $40,000, were made a short time ago.

JACKSON, GA.—A meeting of the stockholders of the Georgia Interurban Railway is called for May 16 in Atlanta. At that date the railroad commission will be requested to grant the right to issue $50,000 bonds to build an electric line from Indian Springs to Jackson. Captain W. F. Smith, of Flovilla, Ga., is interested in the proposed new line. L.

SAN FRANCISCO, CAL.—The power of the city of San Francisco, under the State constitution and municipal charter, to construct and operate the Geary Street railroad has been upheld by Superior Judge John F. Ellison of Tehama County. Horace G. Platt's application for an injunction has been denied and judgment for the City has been ordered entered. A.

GREENFIELD, IND.—The promoters of the Circuit Traction Company report that the bonds have been sold and that the work of building a line to connect the seven county seat towns of the counties bounding Marion County will be begun in a few weeks. The seven county seat towns to be connected are each about twenty-five miles distant from Indianapolis. S.

GADSDEN, ALA.—H. H. Rogers, representing the Noccalula & Southwestern Railway Company, which proposes to build an electric railway from Gadsden to the Falls on Black Creek on Lookout Mountain has petitioned the city council for franchises for the use of certain streets. The railway company plans to build an amusement park at the falls in adidtion to construction of electric railway line. B.

TOLEDO, OHIO.—The finest piece of track in the city of Toledo will soon be installed on Broadway, between Colburn and St. John streets. The street is being repaved and the Toledo Railways and Light Company will reconstruct its track according to the latest and most approved plans, the new rails weighing 100 pounds to the yard, and being ten pounds heavier than any rail now in use in the city. H.

SAN FRANCISCO, CAL.—Paul Shoupe, assistant general manager of the Southern Pacific Company, has accepted the deeds for the right of way for the electric line through Ravenswood. F. E. Chapin, manager of the Peninsula Railroad Company, states that work has begun on the construction of the road. At present the line will be extended as far as the Crow residence, a short distance from Cooley's Landing. A.

OAKLAND, CAL.—Grading for the new electric suburban system, known as the Oakland and Antioch Railway Company, has been started at Walnut Creek. The road is planned to run from Bay Point through Concord, Walnut Creek, Fafayette and by way of the tunnel into Oakland. Fred Brooks, engineer in charge of the construction work announces that the line will be completed this Fall. Both freight and passenger traffic will be handled. A.

FLORENCE, ALA.—Thurston H. Allen, of Florence, is interested in a plan to construct an electric railway from Florence to Huntsville, Ala., a distance of about seventy-five miles. The proposed road would be built via St. Florian, Bailey Springs, Muscle Shoals canal, Rogersville and Athens. This plan includes the development of the Tennesee River waterpower for operation of the road and it is said that engineers will make a survey in a few days. B.

WAYNESBORO, PA.—At a meeting held recently the Blue Ridge Company was organized with a capital of $15,000. The purpose of the company is to build an extension of the Chambersburg, Greencastle and Waynesboro Street Railway from Pen-Mar to Blue Ridge Summit, a distance of four miles. These directors and officers were elected: President, George B. Beaver; secretary, John G. Benedict; treasurer, W. B. Stottlemeyer; W. L. Minick, J. W. Wareheim, I. D. Sefton and J. C. Lane.

WALLA WALLA, WASH.—Active operations in the spending of the $500,000 promised by the Byllesby interests began recently when a crew of surveyors under engineer Robert Smithwick took the field directing operations towards Pendleton. There is a rumor that the line from Fendleton to La Grande, long projected, is to be rushed through as soon as the one from Walla Walla into Oregon is completed. Power sites have been located, it is said, and everything is in readiness for the new movement.

BEAUMONT, TEX.—Application has been made to the city council for a franchise for fifty years to use several of the streets and alleys for the operation of an electric street railway system, and also for a franchise to install an electric light and power plant. It is believed that John W. Gates, of Port Arthur, is interested in the proposition, which also embraces the construction of an interurban electric railway between Beaumont and Porth Arthur. The survey for the proposed interurban line has been made.

INDIANAPOLIS, IND.—The Merchants Heat and Light Company has built and is operating a three-rail electric line from its plant to the Big Four railroad. The road handles thousands of tons of coal and is operated with power from the company's plant. From the time this coal is dug out of the ground it is not touched by human hands. It is loaded at the mine by electric power and unloaded or dumped into the chute, of the crushing machine, and from there mechanically conveyed to the automatic stokers by electric power. S.

LEWISTON, ME., Construction of the new electric road from Lewiston to Portland has been begun and a crew of one hundred men is digging and grading at the Lewiston end of the line. There is already trolley connection between the two cities by way of Brunswick and Freeport, but the new line will pass through Auburn, Gloucester, Cumberland, Gray, West Falmouth and Deering. The line is thirty-five miles in length and the total cost will be about $800,000 when equipped for business in the summer of 1911. The

builders are W. Scott Libbey and Harry M. Dingley, of Lewiston.

PIERRE, S. D.—Articles of incorporation have been filed for the Iowa and Dakota Interurban Railroad, with headquarters at Yankton, and a capital of $500,000. The board of directors is as follows: B. E. Wells, E. E. Bamford, H. E. Valentine, Centerville; C. L. Philipps, W. G. Kirkpatrick, Wagner; Albert Amundson, Lake Andes. The company proposes to build a line from Sioux City to Mitchell, a distance of 125 miles, at an estimated cost of $20,000 a mile. It crosses the counties of Woodbury and Plymouth, in Iowa, and Union, Clay, Turner, Yankton, Hutchinson, Hanson and Davidson, in South Dakota.

BALTIMORE, MD.—A trolley line from Baltimore to York, Pa., running out the Reisterstown pike, now seems assured. Plans have already been completed for the line from Hanover, Pa., to Reisterstown, the franchise having been granted by the Maryland authorities. From Reisterstown, the road will be built into Baltimore, connection being made at Hanover with the lines of the York Railway Company. Work will be started immediately at Reisterstown and as there is little grading and bridge construction work to be done, it is anticipated by the contractors that the work on that end will be completed within a year.

GLASGOW, KY.—Organization of the Louisville, Lincoln Farm & Mammoth Cave Traction Company, with a capital stock of $1,000,000 has been perfected and these officers elected: J. M. Richardson, president; J. A. McDaniels, vice-president; J. Wood, secretary and treasurer; J. Lewis Williams, general counsel. New York and Chicago capitalists are interested in the project. Immediate action will be taken to secure rights of way to Mammoth Cave and the head of navigation on Green River. The road will be built on steam road lines as to gauge and with electric power equipment to enable the interchange of traffic with connecting steam roads.

EASTON, PA.—Arrangements have been made for the Easton & Washington Traction Company and the Northampton Traction Company, to pass under one management at an early date. The former line extends from Phillipsburg, N. J., to Port Murray, N. J., a distance of eighteen miles, and it contemplates pushing east to obtain conenctions across the state to Jersey City. The Northampton Traction Company operates lines from Easton to Nazareth and to Bangor, Pa., with connections to Portland. A four-mile line is contemplated to Delaware Water Gap from Portland, giving trolley connections from Philadelphia to Stroudsburg. Over $1,000,000 is embraced in these plans.

LITTLE ROCK, ARK.—A charter has been granted to the Fort Smith & Van Buren Railway Company, incorporated for the purpose of constructing a line of railway from a point near the southwestern boundary of the city of Fort Smith around that city to a point at the old northern boundary of the city, thence northeasterly to the city of Van Buren, the toal distance being about six miles. The company is also authorized to build a bridge over the Arkansas River in order to reach Van Buren. A capital stock of $250,000 is authorized, the chief stockholder being W. D. Pratt of Fort Smith. Other incorporators are Samuel McLoud, R. G. Robertson, John C. Gardener and James B. McDonough.

BOLIVAR, N. Y.—The Southwestern New York Traction Company of Bolivar has just been incorporated to operate an electric street surface railway, twenty miles long, from Bolivar to Wellsville, by way of Allentown and Scio. The company is capitalized at $200,000. The directors are: C. M. Van Curen and A. J. Matson of Bolivar; Benjamin F. Patterson of New York, and James G. Pugh of Baltimore. More than $57,000 worth of the stock has already been subscribed for by Bolivar, Allentown and Scio people, and most of the rights of way have been donated. The New York and Pennsylvania Traction Company, operating between Olean and Bolivar, is to furnish the motive power for the new road.

TOLEDO, OHIO.—Accepting the invitation of President A. E. Long, of the Toledo Railways and Light Company,, the city of Toledo is now engaged in an inspection of the books and properties of that company, with a view to securing information which will enable the city to act intelligently upon the proposition of franchise renewals, which will soon be asked for. Nau, Tanner and Rusk, expert accountants of Cleveland, have been selected for the work. This firm was closely identified with the Cleveland street car muddle and helped to prepare the figures on which the final settlement of the Municipal Street Railway matter was based. Mayor Whitlock makes it plain that no rights of the city are waived by the investigation. H.

VALDOSTA, GA.—The stockholders of the Valdosta street railway have decided to materially extend the system of tracks in the town, which at present run from the business district out Patterson Street to Pine Park, thence to Strickland cotton mills at Remerton, two and a half miles. Proposed additions include a line down Hill Street to Pear Street, and along the latter thoroughfare back to Patterson, forming a belt line that has been contemplated for some time. It is probable the lines will also be extended to the passenger depot of the Georgia Southern and Florida railroad, and to that company's shops. New officers and directors for the company were elected as follows: President and general manager, W. S. West; vice-president, Abram West, of Jacksonville, Fla.; superintendent and treasurer, A. H. Lane; the directors elected are W. S. and Abram West, L. W. Shaw and E. E. West. L.

## TELEPHONE AND TELEGRAPH.

*(Special Correspondence.)*

SPRINGFIELD, ILL.—The Beloit Home Telephone Company, a Wisconsin corporation, has filed papers under the laws of Illinois, with a capital of $150,000.

DECATUR, ILL.—The Macon County Telephone Company has been incorporated by J. W. Collins, W. E. Surface and A. V. Brownback, with a capital of $150,000.

BORING, ORE.—The Boring Mutual Telephone Company has been incorporated by J. W. Roots, D. W. Boring and H. C. Knox with a capital stock of $5,000.

SALEM, ORE.—The Lewisberg Mutual Telephone Company has been incorporated by E. Bowen, C. H. Thompson and W. J. Haberly, with a capital stock of $1,173. A.

WAUSAU, WIS.—The Wausau Telephone Company has taken bids for the erection of a three-story fireproof echange building at Fourth and McClellan streets. The cost will be $30,000.

BALLINGER, TEX.—The West Texas Telephone Company, with headquarters at Brownwood, Tex., will erect a new exchange building here to cost $20,000 and will make other improvements to its system. D.

PORT LAVACA, TEX.—The Port Lavaca Telephone Company will build a new telephone line from Port Lavaca to Sea Drift and Long Mott. The company recently finished the construction of a line from this place to Lake Placedo. D.

PORTLAND, ME.—The Knox Telephone Company has announced its intention of laying a cable across Penobscot Bay from Owl's Head to North Haven, to cost about $28,000, and to be in operation by June 1. Manager S. M. Bird states that transmission will be bettered one-third.

CULBERTSON, MONT.—The Montana Star Telephone Company has material on hand for the construction of the new line to Brockton. The company has closed a deal for a loan of $15,000 with which to build a line to Nashua, about six miles east of Glasgow. C.

DES MOINES, IA.—The Iowa Telephone Company has filed amended articles of incorporation increasing the capital stock from $4,000,000 to $10,000,000. The increased capital is to be spent in improving the lines in Iowa, particularly the toll lines, which are now overburdened with business.

STAUNTON, IND.—The Syester Telephone company has been incorporated to build and operate a telephone system in Stayton and Clay counties. The company is in the market for material and expert labor for the construction of the plant. Lafe Weaver, John Holdefer and Joseph P. Tiefel are directors. S.

TY TY, GA.—A telephone exchange will be established here to have connection with Southern Bell Telephone and Telegraph Company's system. The exchange to embrace twenty-six telephones, and twenty-two miles of wire will be required in installation. There are now four telephone exchanges in Tift County, and a great number of farmers' lines. B.

DENVER, COL.—The telephone company is carrying on considerable construction work in the neighborhood of Cheesman Park, supplying that district with improved underground and aerial cable telephone equipment at a cost of about $50,000. The work which has been under way for several weeks is about completed and the new lines will soon be brought into service.

HINCKLEY, N. Y.—The Hinckley and Grant Telephone Company of Hinckley, Oneida County, has been incorporated with the Secretary of State with a capital of $1,000 and the following directors: Chas. A. Wilt, Roswell H. Popple, of Grant, Herkimer County, and John Fisher of Hinckley. The company is to operate from Hinckley through Grant to Ohio, Herkimer County.

CELINA, O.—The following were chosen officers of the Celina and Mercer County Telephone Company recently: President, I. E. Crampton; vice-president, Philip Beiersdorfer; corresponding secretary, H. A. Miller; financial secretary, A. M. Riley; treasurer, J. A. Hoagland. Crampton, Hoagland, Beiersdorfer, C. J. Hemmert and E. G. Ungerer constitute the board of directors. H.

ASHEVILLE, N. C.—The Asheville Telephone and Telegraph Company is building a long-distance line to Waynesville, costing about $10,000. Of the twenty-eight miles to be completed about fifteen have been finished to date, and it is said to be the company's purpose to build quite an extensive system of lines radiating out from this city to towns in the various sections of the mountains within reasonable distances. L.

NEW RICHMOND, WIS.—The St. Croix Telephone Company, recently organized here in competition with the Wisconsin Telephone Company, has refused to consider new concessions offered by the Wisconsin Telephone Company. The new company will attempt to purchase the old exchange, and will build a new telephone system if necessary. The concessions offered by the Wisconsin Telephone Company were to reinstate immediately telephones in residences and business places at the old rate of $2 a month for business telephones and $1 a month for residences, to proceed at once to develop the rural telephone lines in the surrounding country, and to sell its local exchange, with certain restriction in its operation. M.

## ELECTRICAL SECURITIES.

The violent and sudden downward movement of stocks during the past week carried prices to even a lower plane than did the February decline. No doubt the sudden news of the grave illness and death of the King of England considerably affected the market toward the end of the week. Later the strong tone of the market left a feeling that the worst of the decline was over.

Chicago Railways Company earnings in April approximated $1,075,000, over ten per cent gain.

A Philadelphia Rapid Transit director says that plans for expediting the $2,500,000 loan have not yet been perfected, and will not be announced prior to the stockholders' meeting, June 2.

The Kentucky Public Service Commission Second District, has authorized the Deer River Power Company, of Watertown, N. Y., to execute a mortgage upon all its property to secure $200,000 six per cent twenty year gold bonds. The company is authorized to issue at present $67,000 bonds at not less than ninety, for payment of obligations incurred in developing power.

Having been advised by the Underground Electric Railways Company, of London, Limited, that there are no profits available for payment of interest for the half year ended December 31, 1909, on its six per cent. income bonds, due 1948, the committee on securities of the Stock Exchange rules that said bonds must carry coupon No. 5 and all subsequent thereto to be a delivery.

At the meeting of the New England Telephone and Telegraph Company, it was voted to increase the number of directors from twelve to fifteen. The three additions will not be made until the consent of the Secretary of State is obtained. Jasper N. Keller and Fletcher D. Proctor were elected directors to succeed M. B. Jones and W. S. Hutchinson. At the directors' meeting following, Jasper N. Keller was elected president to succeed Thomas Sherwin, who became chairman of the board. Francis A. Houston was elected vice-president and general manager.

The Hartford & Springfield Street Railway Company, which is controlled by Boston capital, has resumed the payment of dividends on its $285,000 preferred stock. The distribution is at the rate of two per cent annually. Dividends were suspended in 1907, and the resumption of payments is attributable in part to more prosperous general conditions and in part to the action of the road last fall in increasing its fare unit from five to six cents.

### DIVIDENDS.

Northern Texas Electric, quarterly common dividends of $1.25, payable June 1.

NEW YORK.

| | May 9. | May 2. |
|---|---|---|
| Allis-Chalmers common | 9⅜ | 9⅞ |
| Allis-Chalmers preferred | 35 | 34 |
| Amalgamated Copper | 36 | 67⅛ |
| American Tel. & Cable | *80 | *80 |
| American Tel. & Tel. | 134¾ | 133½ |
| Brooklyn Rapid Transit | 78⅝ | 76 |
| General Electric | 146½ | 146 |
| Interborough-Metropolitan common | 20⅜ | 19½ |
| Interborough-Metropolitan preferred | 54¼ | 52 |
| Kings County Electric | 129 | 129 |
| Mackay Companies (Postal Telegraph and Cables) common | 85 | 85 |
| Mackay Companies (Postal Telegraph and Cables) preferred | 75½ | 75½ |
| Manhattan Elevated | 132 | 133 |
| Metropolitan Street Railway | *18 | 18 |
| U. S. Steel common | 81⅞ | 81¼ |
| U. S. Steel preferred | 117 | 117⅜ |
| Western Union | 68½ | 67¾ |
| Westinghouse common | 62 | 62½ |
| Westinghouse preferred | 110 | 115 |

*Last price quoted.

BOSTON.

| | May 9. | May 2. |
|---|---|---|
| American Tel. & Tel. | 134¾ | 133½ |
| Edison Elec. Illuminating | 249 | 248 |
| General Electric | 146½ | 146 |
| Massachusetts Electric common | 18 | 17¼ |
| Massachusetts Electric preferred | 83½ | 87 |
| New England Telephone | 133 | 133 |
| Western Tel. & Tel. common | 15 | 15 |
| Western Tel. & Tel. preferred | 83 | 86 |

PHILADELPHIA.

| | May 9. | May 2. |
|---|---|---|
| American Railways | 44¾ | 45 |
| Electric Company of America | 11¾ | 11⅞ |
| Electric Storage Battery common | 59 | 57½ |
| Electric Storage Battery preferred | 59 | 57½ |
| Philadelphia Electric | 15 | 14⅞ |
| Philadelphia Rapid Transit | 17 | 15¼ |
| Philadelphia Traction | 83 | 83 |
| Union Traction | 44 | 43 |

CHICAGO.

| | May 9. | May 2. |
|---|---|---|
| Chicago Railway, Series 1 | 98 | 98 |
| Chicago Railways, Series 2 | 28⅜ | 28½ |
| Chicago Subway | 2⅝ | 2⅝ |
| Chicago Telephone | 119½ | 120 |
| Commonwealth Edison | 113 | 112 |
| Metropolitan Elevated common | 15 | 15 |
| Metropolitan Elevated preferred | 56 | 54 |
| National Carbon common | 108 | 108 |
| National Carbon preferred | 116 | 116 |

## PROPOSALS.

POST OFFICE, NORTH YAKIMA, WASH.—The office of the Supercising Architect, Washington, D. C., will receive sealed bids until May 26, for the construction, complete (except elevator including plumbing, gas piping, heating apparatus, eletric conduits and wiring of the United States Post Office at North Yakima, Washington, in accordance withe drawings and specification, copies of which may be obtained from the custodian of site at North Yakima, Wash. or at the Supervising Architect's office.

POST OFFICE, ASBURY PARK, N. J.—The office of the Supervising Architect, Washington, D. C., will receive sealed bids until June 14 for the construction complete (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the United States Post Office at Asbury Park, N. J., in accordance with drawings and specifications, copies of which may be obtained from the custodian of site at Asbury Park, N. J., or at the Supervising Architect's office.

POST OFFICE, MIDDLETOWN, N. Y.—The office of the Supervising Architect, Washington, D. C., will receive sealed bids until June 9 for the construction complete (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the United States Post Office at Middletown, N. Y., in accordance with drawings and specifications, copies of which may be obtained from the custodian of site at Middletown, N. Y., or at the Supervising Architect's office.

LIGHTING SYSTEM, FORT MISSOULA, MONT.—The office of the Constructing Quartermaster will receive sealed proposals until May 20 for the following work: 1, furnishing and installing meters and fixtures in eleven sets officers' quarters, four sets noncommissioned officers' quarters, two double barracks, one stable, one bakery and one post exchange and gymnasium; 2, the construction of a street light line, service connection with buildings, including all necessary items for same; 3, furnishing and installing tungsten lamps, switchboard and all apparatus necessary for a substation; 4, construction of a reinforced concrete building for transformer substation. Full information furnished upon application. Envelopes containing proposals should be marked "Proposals for an Electric Lighting System" and addressed to A. B. Shattuck, major, fourth infantry, constructing quartermaster.

NAVY DEPARTMENT SUPPLIES.—The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will open bids on naval supplies on the dates given below. Bidders interested therein should make early application for copies of the schedule, giving the schedule numbers desired. Schedules can be obtained from the Navy Pay Office nearest each navy yard. Bids will be asked on the following supplies:

| Date of Opening. | Material. | Quantity. | Place of Delivery. | Schedule No. |
|---|---|---|---|---|
| May 24— | Air compressors, motors, etc. | 2 | Hingham, Mass. | 2450 |
| | Pump, electrically driven. | 1 | Hingham, Mass. | 2459 |
| | Air compressors, motors, etc. | 2 | Hingham, Mass. | 2450 |
| | Generators, transformers, etc. | Miscellaneous. | Hingham, Mass. | 2450 |
| | Telephone exchange. | 1 | Charleston, S. C. | 2454 |
| May 31— | Furnishing and installing arc lamps and tugsten clusters | Miscellaneous. | North Chicago, Ill. | 2470 |

## NEW INCORPORATIONS.

MILWAUKEE, WIS.—The Independent Electric Manufacturing Company has been incorporated with a capital of $10,000 by J. T. Kaweit, W. H. Gaulke, J. M. Allman and Hans Christiansen.

DENVER, COL.—The Abbott Automatic Air and Electric Machinery Company has been incorporated with a capital of $50,000 by William L. Abbott, Mary E. Clark and Nora T. Abbott.

FRESNO, CAL.—The Modern Electrical Fixture Company has been incorporated with a capital of $25,000 by H. H. Cartwright, W. E. Bledsoe and J. H. Blake.

OKLAHOMA CITY, OKLA.—The Federal Sign System has been incorporated with $10,000 capital by H. A. Stewart, J. W. Lindsey and Ross N. Lillard. The company will manufacture electric signs.

WILMINGTON, DEL.—The New York State Wireless Telephone and Telegraph Company has been incorporated with a capital of $2,500,000, by H. Darlington, E. R. Devine, E. R. Cochran, Jr., Wilmington.

SAN DIEGO, CAL.—The San Diego Electric Fixture Company has been incorporated by P. W. Dyment, Lottie P. Dyment, B. E. Powers and Wm. Biard, all of this city. The company will manufacture and sell electric fixtures of all kinds.

KALAMAZOO, MICH.—The Hydro-Carbon Electric Light and Power Company has been incorporated with a capital of $250,000 to manufacture primary electric batteries. The officers of the concern are Dr. Boss, president; Arthur J. Free, Grand Rapids, secretary and treasurer; Eber Rice, Grand Rapids, vice-president.

ATLANTA, GA.—The Southern Electrican Publishing Company, has been incorporated with $9,000 capital stock by W. R. C. Smith, C. S. McMahon, and S. C. Johnson, to do a general printing and publishing business and primarily the publishing of "The Southern Electrician," previously sent forth by the W. R. C. Smith Publishing Company, Atlanta.

## PERSONAL MENTION.

FRANZ MORTENSON, who has been assistant at the electric light plant at Litchfield, Minn., has accepted the position of superintendent of the plant at Paynesville, Minn.

J. C. ROTHERY, general manager of all the traction lines in Columbiana and Jefferson counties, in Ohio, has resigned and will go to South America where he will build an electric road.

JOHN R. ALLEN, professor of mechanical engineering, University of Michigan, will head the engineering school to be established at Robert College, Constantinople. Professor Allen will go to Turkey early next summer.

GEORGE M. CAMPBELL, formerly superintendent of the power-apparatus shops of the Western Electric Company, Chicago, Ill., is now connected with the turbine department of the General Electric Company at West Lynn, Mass.

HENRY S. HOLLAND, who was formerly the manager of the Chicago office of the Pacific Electric Heating Company, has resigned to become general salesman of the Simplex Electric Heating Company of Cambridge, Mass. Mr. Holland's headquarters will be in Chicago.

W. A. STADELMAN, well known in the electrical field, and interested in the Darley Engineering Company, of 149 Broadway, New York, is seriously ill at his home in Rye, N. Y. Mr. Stadelman's large circle of friends throughout the electrical industry will regret to learn of his indisposition, and hope for his early recovery.

H. N. HURT, superintendent of the Georgia Railway and Electric Company of Atlanta, Ga., has handed in his resignation after twenty years' service, and is succeeded by the assistant superintendent, S. E. Simmons. It is understood that Mr. Hurt proposes to enter into politics in Fulton county, of which Atlanta is the county seat.

C. F. DIETRICH, president of the Indiana Lighting Company and also of the Northern Indiana Traction Company, in company with prominent officials of the two companies visited Lafayette, Ind., on May 2, on an inspection tour. The party inspected the lighting systems owned by the Indiana Lighting Company at Peru, Logansport, Lafayette and Frankfort.

E. L. CLINE, who for several years has been manager of the Toledo Home Telephone Company at Toledo, Ohio, has been made general manager of the New Telephone Company at Indianapolis. His successor in Toledo has not yet been chosen. Mr. Cline has been in charge of the Indianapolis property since its transfer to Morgan some time ago, but has retained his Toledo position.

CHARLES WHITING BAKER, vice-president of the American Society of Mechanical Engineers, has been appointed honorary vice-president to represent the society at the International Congress of Mining, Metallurgy, Applied Mechanics and Practical Geology, to be held at Düsseldorf, Germany, June 20-23, 1910. Mr. Baker has also received an appointment from the State Department as a delegate from the United States.

E. W. WINTER, president of the Brooklyn Rapid Transit Company, returned from Europe after a three months' absence. In Egypt he contracted typhoid fever, but he had entirely recovered from this before sailing for home. His physicians, however, have advised him to be somewhat slow about resuming his railroad duties, and it is probable that it will be some weeks before he takes up again active work at his office.

H. H. SEAMAN, who for the last six months has been assistant manager of the electrical department of the H. W. Johns-Manville Company, New York, and who, previous to this time, was connected with the Electric Storage Battery Company of Philadelphia, has been forced to resign his position to take charge of the business of his father, who died recently. In the future, Mr. Seaman will be with W. S. Seaman & Company, Milwaukee, Wis., manufacturers of telephone booths and automobile bodies.

BUTLER KEYS, for many years with the Consolidated Car Heating Company and recently with the Home Rubber Company, has been appointed manager of the sales department of the Hemming Manufacturing Company, with headquarters at No. 2 Rector Street, New York. This company owns the Hemming and Gummon patents and has completed a specially designed plant for the manufacture of fireproof and waterproof moulded insulating materials, under these patents, at Garfield, N. J. Mr. Keys is very enthusiastic over this new product, for which great claims are made, and feels confident that it will greatly interest his numerous friends in the electrical trade.

## OBITUARY.

WALTER CRAIG KERR, president of Westinghouse, Church, Kerr & Company, died on May 8 at Rochester, Minn. For two months he has been suffering from cancer, and his death was directly due to uremia which followed an operation. Mr. Kerr was born at St. Peter, Minn., on November 3, 1853. He studied mechanical engineering, and after he was graduated from Cornell University he became an assistant professor there. In 1883 Mr. Kerr became connected with the Westinghouse interests, and later was elected president of Westinghouse, Church, Kerr & Company. He became a trustee of Cornell University in 1890. He was also a director in the Westinghouse Machine Company and the Security Investment Company. With offices at No. 10 Bridge Street, Mr. Kerr spent the greater part of the last twenty years on Staten Island. He moved from New Brighton to Dongan Hills fourteen years ago. He leaves a wife, formerly Miss Lucy Lyon, of Ithaca, N. Y., and four children. Among the organizations of which Mr. Kerr was a member are the American Society of Mechanical Engineers, Franklin Institute Engineers' Club, Lawyers' Club, Cornell Club, New York Yacht Club, Seawanhaka Corinthian Yacht Club and the Richmond County Country Club.

## LEGAL NOTES.

RESPONSIBILITY FOR SUFFICIENCY OF FIXTURES AND LOSS BY FIRE.—In the case of Hanton and others vs. the New Orleans & Carrollton Railroad, Light and Power Company, 50 So. R. 544, brought to recover a fire loss of $26,785.53, the supreme court of Louisiana says that the evidence satisfied the jury that on the day of the fire the company, by its fault, passed through the wires by which the plaintiffs' house was lighted a current of electricity of greater power and strength than the fixtures in the house were prepared to receive and meet. The company insisted that the fire would not have occurred had the fixtures in the house been such as it was entitled to require that they should have been. But those fixtures had been in use for years before the fire, without injury or loss. They were accepted by the company as sufficient. Had anything been wrong about them, the company should have ascertained the fact by inspection and examination. Householders know nothing whatever of electricity, nor what the requirements called for to insure safety. The company was engaged in that particular business, and supposed to be informed fully as to what was needed in the premises. A judgment rendered in favor of the plaintiffs is affirmed.

POTTER RE-ISSUE PATENT NO. 12,241 DECLARED INVALID—DECISION INVOLVES IMPORTANT POINT IN PATENT LAW.—The Supreme Court of the United States recently handed down a memorandum decision refusing to grant a writ of certiorari to the Circuit Court of Appeals of the Seventh Circuit, in a suit brought against the Richmond Interurban Street Railway Company on the Potter reissue patent for an improvement in controllers for railway motors. The defendant company had purchased the apparatus on which suit was brought from the Allis-Chalmers Company, which latter company defended the suit. The claims of this reissue patent purport to broadly cover the blow-out magnet and arc-deflector structure, which is now a standard construction in practically all forms of drum-type railway controllers. The original patent, No. 524,396, was granted to the General Electric Company as assignee of William B. Potter on August 14, 1894. The claims of the original patent covered the blow-out magnet construction broadly, and also a specific form of arc-deflector, or chimney, which co-operated with the blow-out magnet. The patent was reissued as No. 12,241 on July 19, 1904, ten years after the original patent was granted with claims broader in scope than those of the original patent, and aimed to cover any controller construction in which the arc was forced by the magnetic flux against a wall or plate. In other words, these claims attempted to cover the broad idea of interposing insulating septa or plates between the contact fingers of the drum-type controller, provided with a magnetic blow-out. Shortly after this reissue patent was granted suits were started by the General Electric Company against the Allis-Chalmers Company in New Jersey and against one of its customers, the Richmond Interurban Street Railway Company, in Indiana. The latter suit (defended by the Allis-Chalmers Company) reached final hearing first before Judge Anderson, in the United States Circuit Court of the District of Indiana, who dismissed the bill of complaint for want of equity. The case was immediately appealed to the Circuit Court of Appeals of the Seventh Circuit. The opinion of the Court of Appeals affirmed the decree of the lower court holding the reissue patent void. From this decision of the Circuit Court of Appeals a petition for writ of certiorari was filed by the General Electric Company in the Supreme Court of the United States to have the case reviewed by the Supreme Court, and the petition was denied, leaving the decision of the Court of Appeals standing.

## INDUSTRIAL ITEMS.

THE ELECTRICAL ALLOY COMPANY, Morristown, N. J., is mailing flyers calling attention to its high-grade resistance material. An especial point is made of "Nico," a new resistance alloy.

THE UNITED STATES LIGHT AND HEATING COMPANY, New York , N. Y., announces that on May 1 its Chicago office was moved from 745 Monadnock Block to 1013 Peoples Gas Building.

THE METROPOLITAN SWITCHBOARD COMPANY, Long Island City, N. Y., announces that its factory has been moved to East Avenue and Fourteenth Street, and requests that mail for the factory shall be addressed there.

THE W. S. ROCKWELL COMPANY, New York, N. Y., is mailing bulletin No. 10 on the Rockwell reverberatory melting and refining furnaces. These furnaces are used largely for reducing copper and brass wire and miscellaneous scrap.

THE ARNOLD COMPANY, Chicago, Ill., is mailing a new postal card of its construction series. This card shows the beginning of work on the locomotive terminal plant of the Kansas City Southern Railway Company at Leesville, La.

ROSSITER, MACGOVERN & COMPANY, New York, N. Y., has issued its March catalogue of electrical machinery, dynamos and motors. The booklet contains prices on all standard types of motors and generators, some of which are shown in illustrations.

THE BISON STORAGE BATTERY COMPANY, Buffalo, N. Y., is distributing folders on the Bison ignition and lighting batteries. The "Bison Jr.," which is illustrated, is of the three compartment type and is especially designed to meet the demands of the most critical.

THE DENVER GAS AND ELECTRIC COMPANY, Denver, Col., is sending out attractive calendars for the month of May. The calendar is imprinted with a decorative picture of a golf girl and the accompanying text calls attention to the company's gas appliances.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn., gives in the May number of *Trumbull Cheer* a number of valuable points to buyers. This issue also contains illustrations and prices of combination knife switches and baby knife switches.

THE H. T. PAISTE COMPANY, Philadelphia, Pa., in its May issue of *Paistery* gives a number of valuable pointers on Paiste wiring supplies. The entire issue is devoted to two lines of supplies, the first being the Molding Taplet fittings and the second the Pipe Taplet fittings. Each style is illustrated and prices are given.

MACGOVERN, ARCHER & COMPANY, New York, N. Y., has issued its May list of electrical and steam machinery, cars and equipment. The booklet lists electrical machinery of nearly every make, style and size. A number of illustrations show the machinery of various San Francisco substations, which this company is offering for sale.

THE CUTTER ELECTRICAL AND MANUFACTURING COMPANY, Philadelphia, Pa., announces that its western branch has been moved to 98 Jackson Boulevard, Chicago. Representatives of the company at that address are ready to discuss the applications of the I-T-E circuit breaker to problems in the protection and control of electrical apparatus.

THE BRISTOL COMPANY, Waterbury, Conn., has recently issued bulletin 124 describing Bristol's atmospheric recording thermometer. The type described is used extensively in residences for obtaining a continuous record of the outside atmospheric temperature. Other and larger bulletins describing other forms of the thermometer are to be published later.

THE H. W. JOHNS-MANVILLE COMPANY, New York, N. Y., is mailing a post-card folder on the subject of J-M asbestos roofing. An interesting experiment with this roofing is suggested on the card. The suggestion is made that a piece of J-M asbestos roofing be subjected to the flame of a gasoline blow torch and a similar trial be made with any other roofing.

THE EMERSON ELECTRIC MANUFACTURING COMPANY, St. Louis, Mo., recently published the May number of *The Emerson Monthly*, which deals especially with electric fans and ventilation. An article on "Ceiling Fans in Picture Theatres" describes the installation and shows the position of the fans diagrammatically. There are also several other articles of interest.

THE NATIONAL ACME MANUFACTURING COMPANY, Cleveland, O., is sending out a circular letter calling attention to the work and time that can be saved by using Acme automatics. An attached flyer shows an Acme automatic multiple spindle screw machine and a piece turned out by it. The piece was faced drilled and taper-formed in the time required to form it.

THE HORNBERGER TRANSFORMER COMPANY, Lafayette, Ind., is distributing through its agents a folder treating of the facilities, guarantees and construction of Hornberger transformers. The company announces that it is prepared to ship, on short notice, special transformers of any size up to 300 kilowatts. All transformers are guaranteed for a period of two years. The folder has a page of tabulated information on transformers.

THE ALLIS-CHALMERS COMPANY, Milwaukee, Wis., has recently received a number of orders for electrical machinery to be installed in the Western states. Among these is a 1,000-kilovolt alternator for the United Gas and Electric Company at Hutchinson, Kan. The company will also install motor drive in the mill of the Grays Lumber Company at Hoquiam, Wash.

THE LORD MANUFACTURING COMPANY, New York, N. Y., has found it necessary to add to its list several iron, steel and brass foundries in order to meet the largely increased and constantly increasing demand for its material. Thus far this year the company has entered orders and contracts to such an extent that it is negotiating for a largely increased production in the factory. It is at present doing about 300 per cent more business than at any time within the previous three years, although its business for the last three years has shown a constant growth. The company's product has made for itself the reputation which is resulting in this marked improvement in business which is not confined to the United States but to a large foreign trade.

THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, of Pittsburg, Pa., is adding a 300-kilowatt Westinghouse high pressure steam turbine set to the plant of the White River Light and Power Company, Noblesville, Ind. The new unit will be installed at the generating station, two miles above Noblesville, on the White River, furnishing three phase, sixty cycle power at 2300 volts for lighting and power in the city. The turbine is to operate at a steam pressure of 150 pounds, exhausting into a vacuum of twenty-eight inches. The economy of the turbine equipment makes it a comparatively inexpensive auxiliary of the water power apparatus during the variation of flow in the source of water supply.

THE OHIO BRASS COMPANY, of Mansfield, Ohio, who have been the exclusive selling agents of the Akron Hi-Potential Porcelain Company, of Barberton, Ohio, have purchased a controlling interest in the Akron Hi-Potential Porcelain Company and changed the name to the Ohio Insulator Company, with main offices at Mansfield, Ohio; factory will remain at Barberton, Ohio. The officers of the Ohio Insulator Company are: F. B. Black, president; C. K. King, vice-president; A. L. Wilkinson, secretary; H. S. Black, treasurer, and Geo. A. Mead, factory manager. Geo. H. Kile will remain with the company as one of the directors. The officers will all be located at Mansfield, Ohio, with the exception of Mr. Mead, factory manager, who will be located at Barberton. All purchases will be made through the Barberton office and invoices should be sent to that place; all accounts will be paid from the main office at Mansfield. The Ohio Insulator Company assumes all the debts of the Akron Hi-Potential Porcelain Company and will collect all outstanding accounts.

THE GENERAL ELECTRIC COMPANY, Schenectady, N. Y., is distributing an attractive pamphlet describing the single truck type of gas-electric motor car. The car is at present in regular service and is similar in appearance to the ordinary single truck motor car. The car body and trucks are especially designed for strength and lightness. The equipment consists of a direct coupled gas-engine and generator with an exciter on the same shaft, all completely inclosed and mounted between the axle of the truck and below the car floor, so that the interior of the car is entirely unobstructed. The operation is similar to that of an ordinary trolley car, and the car can be operated in either direction with equal facility. The car, motor, and engine are illustrated and described in Bulletin 4730, which contains also a table of schedule speeds for this car. The company has also issued Bulletin 4729 illustrating and describing the various types of Mazda economy diffusers.

### DATES AHEAD.

National Electric Light Association. Annual convention, St. Louis, Mo., May 23-28.

Maine Electrical Society. Next meeting, Portland, Me., May 25.

National Electrical Trades Association. Next meeting, San Francisco, Cal., June, 1910.

Mississippi Electric Association. Annual convention, Greenville, Miss., June 15 and 16.

American Institute of Electrical Engineers. Annual convention, Waumbeck Hotel, Jefferson, N. H., June 27, 28, 29 and 30.

Ohio Electric Light Association. Annual convention, Greenville, Miss., June 15 and 16.

Michigan Electrical Association. Annual convention, Port Huron, Mich., August 16, 17 and 18.

Colorado Electric Light, Power and Railway Association. Next convention, Glenwood Springs, Colo., September 21, 22 and 23.

# Directory of Electrical and Allied Engineering and Scientific Societies

(Published in the second issue of each month.)

ALABAMA LIGHT AND TRACTION ASSOCIATION. Secretary, Lloyd Lyon, secretary and auditor Mobile Light and Railway Company, 158 Government Street, Mobile, Ala.

AMERICAN ASSOCIATION OF ELECTRIC MOTOR MANUFACTURERS. Secretary, W. H. Tapley, 29 West Thirty-ninth Street, New York, N. Y.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Secretary, L. O. Howard, Smithsonian Institution, Washington, D. C.

AMERICAN ELECTROCHEMICAL SOCIETY. Secretary, Dr. J. W. Richards, Bethlehem, Pa.

AMERICAN ELECTROTHERAPEUTIC ASSOCIATION. Secretary, Dr. Albert C. Geyser, 352 Willis Avenue, New York city.

AMERICAN FOUNDRYMEN'S ASSOCIATION. Secretary, Dr. Richard Moldenke, Wachtung, N. J.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Secretary, Ralph W. Pope, Engineering Societes Building, 29 West Thirty-ninth Street, New York city.

AMERICAN INSTITUTE OF MINING ENGINEERS. Secretary, Rossiter W. Raymond, 29 West Thirty-ninth Street, New York city.

AMERICAN MATHEMATICAL SOCIETY. Secretary, F. N. Cole, 50 West One Hundred and Sixteenth Street, New York city.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION. Secretary, J. W. Taylor, Old Colony Building, Chicago, Ill.

AMERICAN ROENTGEN-RAY SOCIETY. Secretary, Dr. G. C. Johnson, 514 Bijou Building, Pittsburg, Pa.

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# RECORD OF ELECTRICAL PATENTS.

**Issued (United States Patent Office) May 3, 1910.**

956,519. ELECTRODE FOR ARC-LAMPS. George M. Dyott, Pittsburg, Pa., assignor to Westinghouse Electric and Manufacturing Company. Filed April 28, 1906. An electrode comprises a block of iron having a plurality of end recesses and titanic material contained within the recesses.

956,530. ATTACHMENT FOR TELEPHONES. Aben G. Howard, Holdrege, Neb. Filed March 9, 1909. The attachment comprises a frame swinging in a vertical plane, toothed disks rotatably mounted in the frame, sound-emitting tongues having a different pitch engaged respectively by the tongues upon movement of the frame and rotation of the disks, and means for rotating the disks and simultaneously swinging the frames.

956,536. INTERLOCKING SAFETY DEVICE FOR ELEVATORS. Robert P. Lumley and Henry G. Hillman, New York, N. Y., assignors to Public Safety Company, Washington, D. C. Filed October 5, 1906. Includes an electrically operated emergency switch.

956,543. DYNAMO-ELECTRIC MACHINE. Charles A. Psilander and Thomas S. Scott, Pittsburg, Pa., assignors to Westinghouse Electric and Manufacturing Company. Filed February 6, 1906. A frame or shell has symmetrically disposed openings and recesses or grooves alternating circumferentially therewith, and a laminated core and brush holders have projections that fit into the recesses or grooves.

956,544. COMBINED ELECTRIC ARC OR RESISTANCE AND INDUCTION FURNACE. James H. Reid, Newark, N. J. Filed February 3, 1909. An electric furnace has a suspended annular induction heating coil adapted to be lowered into the charge.

956,548. BRUSH-HOLDER FOR DYNAMO-ELECTRIC MACHINES. Egbert M. Tingley, Pittsburg, Pa., assignor to Westinghouse Electric and Manufacturing Company. Filed April 4, 1906. A box has a supporting arm and a longitudinal ventilating passage, and a direct-acting spring operates within this box and is insulated from the carbon brush.

956,549. DYNAMO-ELECTRIC MACHINE. Egbert M. Tingley, Pittsburg, Pa., assignor to Westinghouse Electric and Manufacturing Company. Filed December 3, 1906. Renewed September 30, 1909. An armature winding comprises a plurality of coils, and insulating blocks are bound to the coils by an insulating wrapping for so stiffening and separating the winding as to interfere with the coil ventilation to a minimum degree.

956,553. COIL-SHIELD FOR DYNAMO-ELECTRIC MACHINES. John E. Webster, Pittsburg, and Frank Duff, Allegheny, Pa., assignors to Westinghouse Electric and Manufacturing Company. Filed April 28, 1906. A shield for a dynamo-electric machine coil and its leads has diagonally opposite edge portions bent partially around the coil leads to protect them from injury.

956,554. DYNAMO-ELECTRIC MACHINE. John E. Webster and Joseph L. Davis, Pittsburg, Pa., assignors to Westinghouse Electric and Manufacturing Company. Filed March 9, 1908. A field-magnet frame has polar projections and coils mounted on the projections, and spring frames (having side and end strips curved in opposite directions) are interposed between the coils and the frame.

956,603. ELECTRIC-FIXTURE FITTING. Edward C. Ruth, Mount Vernon, N. Y. Filed November 6, 1909. A base plate arranged to be secured to the wall has a passage through it, as has also a coupling arranged to be secured to the fixture, and co-operating interlocking lugs carried by both of these have a clearance passage at the side for the passage of circuit wires.

956,666. BRUSH-HOLDER FOR DYNAMO-ELECTRIC MACHINES. Carl B. Auel, Wilkinsburg, Pa., assignor to Westinghouse Electric and Manufacturing Company. Filed July 9, 1906. The brush holder comprises a sheet-metal box having laterally projecting arms at one side, a two-part sheet-metal socket-clamp at the opposite side, a sheet-metal finger pivotally supported between the arms and having a free end, and a spring for pressing the free end of the finger against a brush located in the box.

956,674. SWITCH OR OUTLET BOX. William A. Bonnell, Brooklyn, N. Y., assignor to Hattie W. F. Bonnell, Brooklyn, N. Y. Filed May 29, 1909. Has a feature of design whereby the conduit is gripped at the greatest distance from its end within the box.

956,679. ELECTRIC SWITCH. Joseph H. Champ and Theodore H. Schutt, Cleveland, Ohio, assignors to the Bishop & Babcock Company, Cleveland, Ohio. Filed November 27, 1909. Comprises a fixed contact member, a pivotal contact member, a member oscillatory about an axis other than that of the pivotal contact member and having a peripheral notch adapted to engage the pivotal member to open and close the circuit but permitting limited movement relatively to the pivotal contact member without such actuation, and a tension spring connected to the actuating member eccentrically of its axis, whereby the actuating member is maintained in a position either to open or close the pivotal contact member.

956,686. PHASE-SPLITTER. Henry H. Cutler, Milwaukee, Wis., assignor to the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. Filed March 9, 1905. A phase splitter for starting an alternating-current motor, adapted to connect the field windings of the motor in parallel paths, comprises a separate resistance for each of said paths (the resistances being such

as to supply the field windings with currents of different phase), a resistance common to each of the first resistances for reducing the voltage of the current supplied to the field windings when connected in parallel, and a single movable member for adjusting the resistances.

956,699. CROWN OR COVER OF ELECTRIC FURNACES. Paul Girod, Ugine, France. Filed July 26, 1907. A cover for electric furnaces comprises a frame of refractory material, a water-cooled mass of metal of limited area supported in the frame and having electrode openings, and a metal band surrounding the frame and defining the outer edge of the cover.

956,732. RACK-RAIL LOCOMOTIVE. Charles A. Pratt, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill. Filed January 28, 1907. The motor is reversed to act as a dynamo with braking effect when the locomotive is running down grade.

956,739. BRUSH-HOLDER. Robert Siegfried, Pittsburg, Pa., assignor to Westinghouse Electric and Manufacturing Company. Filed November 3, 1906. A brush holder for dynamo-electric machines comprises two side-by-side sheet-metal pieces riveted together in close engagement except at one end where they are spread apart and bent to form a box for the brush.

956,751. COIN-CONTROLLED TELEPHONE. Robert L. Bowman, Knoxville, Tenn. Filed September 9, 1909. Includes a coin-testing member, etc.

956,764. PROCESS OF PRODUCING LITHOGRAPHIC-PRINTING PLATES. William Gerb, Berlin, Germany. Filed May 4, 1909. The process consists in electrodepositing a layer of nickel on a cathode plate the surface of which is grained in such a manner as to impart to the surface of the nickel layer a character adapted for lithographic printing, electrodepositing on such nickel layer a backing layer of metal, and separating the combined plate from the cathode.

956,778. ADJUSTABLE SPARK-PLUG. Jefferson S. Palmer, Clark, S. D. Filed January 16, 1908. A central electrode is used in combination with a screw-adjusted electrode.

956,782. SIGNALING SYSTEM. Harry O. Rugh, Sandwich, Ill., assignor to Sandwich Electric Company, Sandwich, Ill. Filed February 15, 1909. A step-by-step device having under its control selective signaling means is used in combination with switching means at a central station to operate the signaling means in either of a plurality of different ways with a given operative position of the step-by-step device.

956,798. ELECTRICALLY-OPERATED TYPEWRITER. Charles S. Du Belle, Williamsport, Pa. Filed June 8, 1909. Has an electrically operated return device for the carriage.

956,808. TELEGRAPHIC RELAY. Isidor Kitsée, Philadelphia, Pa. Filed January 27, 1908. In cable telegraphy, a receiving organism comprises a movable coil in the region of a stationary magnetic field, two relaying contacts therefor, one relaying contact movable and suspended on a conducting thread, the second relaying contact stationary, a localized source of current, one pole connected to the stationary contact and the second pole connected to the conducting thread; a second circuit is provided for the source of current and a translating device in the second circuit.

956,815. ANNUNCIATOR. Christian Miller, New York, N. Y., assignor to Edwards & Company. Filed March 6, 1909. Comprises a frame having ears, a magnet fixed between the ears and having an exposed pole, an armature journaled in the frame and having an arm projecting into proximity to the pole and a rearwardly projecting arm constituting a stop, a spring for normally separating the armature from the pole, and a shutter pivoted in the frame and normally engaged by the first-mentioned arm and thereby restrained against dropping.

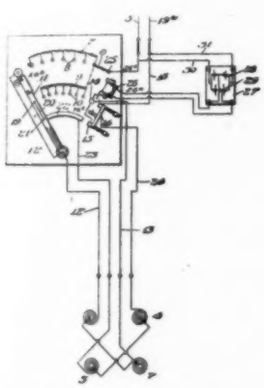
956,845. SINGLE-PHASE ALTERNATE-CURRENT MOTOR AND GENERATOR. Valere E. Fynn, London, England. Filed December 19, 1906. In combination with a stationary member provided with a main inducing winding is an induced member closed by way of brushes along an axis displaced from that of the main inducing winding, also an auxiliary winding on the stator in inductive relation to the main inducing winding and connected in series with the induced member along an axis coinciding with that of the main inducing winding.

956,849. PORTABLE ELECTRIC DRILL. William C. Hafemeister, Cleveland, Ohio, assignor, by mesne assignments, to the Van Dorn & Dutton Company, Cleveland, Ohio. Filed December 11, 1908. Describes the internal gear mechanism, etc., of a motor-driven drill.

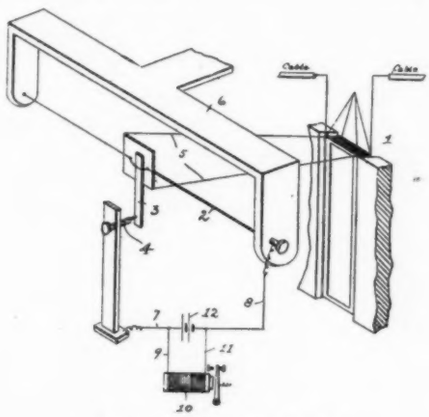
956,855. DYNAMO-ELECTRIC MACHINE. Fred B. Howell, Schenectady, N. Y., assignor to General Electric Company. Filed October 14, 1907. A stator core is provided with a concentrated winding and a distributed winding, the latter being carried in open slots overhung on one side only, all the slots for each pole of the distributed winding being overhung on the same side and the sides of the slots for each pole being parallel. The distributed winding comprises two sets per pole of form-wound coils placed side by side in the slots, the coils of each set being bound together and bodily removable.

956,868. GAS-FIRE-LIGHTING DEVICE. Charles C. Vail, Columbus, Ohio. Filed March 11, 1909. Describes an electric igniting system.

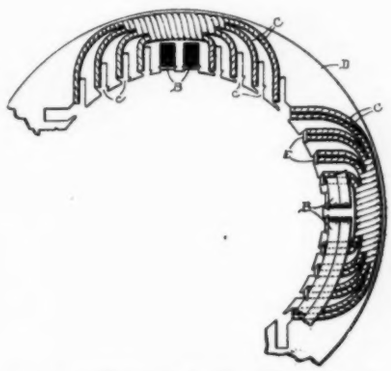
956,870. REFRACTORY WATERPROOF INSULATING COMPOUND. William H. Wright and Joseph Hoffman, Schenectady, N. Y., assignors to General Electric Company. Filed September 4, 1903. An artificial stone consists of ground soapstone, a refractory adulterant, and cryolite fused sufficiently to bind the ingredients together but without destroying the physical characteristics of the soapstone.



956,686.—PHASE-SPLITTER.



956,808.—TELEGRAPH RELAY.



956,855.—DYNAMO-ELECTRIC MACHINE.

956,877. TESTER FOR ELECTRIC BLASTING-FUSES. Francis Beattie, Leete Island, Conn. Filed February 23, 1909. A tester for electric blasting fuses comprises a box, a bracket in the box, a battery cell between the bracket and one end of the box, an electric lamp between the bracket and the other end of the box, a pair of batteries opposite the light and battery, connections for the batteries at one end of the box, and binding posts at the opposite end in connection with the light and batteries, whereby when the circuit is closed the lamp will be lighted and the electric current regulated.

956,893. ALTERNATING-CURRENT MOTOR. Valere A. Fynn, London, England. Original application filed December 19, 1906. Divided and this application filed March 6, 1909. A stationary member is provided with a main inducing winding, an induced member is short-circuited along an axis approximately coinciding with that of the main inducing winding, and a phase converter is connected in series relation with the induced member along another axis.

956,894. ALTERNATING-CURRENT MOTOR. Valere A. Fynn, London, England. Original application filed December 19, 1906. Divided and this application filed March 6, 1909. Similar to the preceding.

956,911. TELEPHONE-BRACKET. Rollo M. Vick, Detroit, Mich. Filed May 10, 1909. A table is supported by a bracket arm.

956,919. PROCESS FOR THE PREPARATION OF SECONDARY-BATTERY PLATES. Frank A. R. Wright, Cleveland, Ohio. Filed March 27, 1909. The process of forming peroxide and spongy lead plates, consists in immersing a plurality of plates in an electrolyte comprising sulfuric acid and an oxidizing chemical substance, sending a current of electricity through the plates and electrolyte in one direction and then reversing the direction of the current, the oxidizing chemical being present in

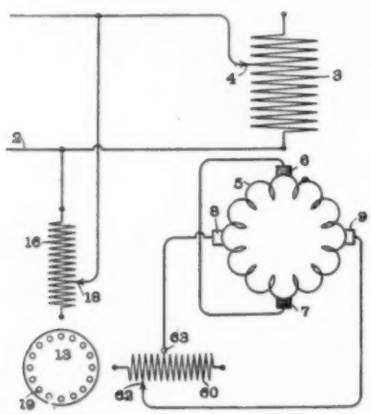
the electrolyte bath in such quantities so that, when the current is first allowed to pass, lead peroxide will be formed on the anode plates, and when the current is reversed the peroxide of lead will likewise form on the anode plates.

956,936. APPARATUS FOR TEACHING WIRELESS TELEGRAPHY. Frank E. Butler, Detroit, Mich., assignor to American Wireless Institute. Filed June 26, 1909. Comprises a sending circuit consisting of a sending key, an adjustable core resistance coil, a buzzer and a generator in series, receiving circuits each consisting of an adjustable core resistance coil and a telephone receiver in shunt around the coil, and means for connecting the sending circuit in series with one or more receiving circuits.

956,952. AUTOMATIC STOPPING DEVICE FOR MOTOR-VEHICLES. Victor Emden and Frank H. Dearborn, New York, N. Y. Filed February 16, 1910. In combination with a motor vehicle are a guide carried thereby, a contact device having a rod fitting the guide and provided with a circuit-controller arranged normally to occupy a closed position, and a locking device arranged to co-operate with the rod when the circuit-controller is in open position and maintain said parts in condition to prevent the operation of the motor until the parts are restored to normal position by manipulation of the lock by the operator.

956,953. ANTISEPTIC TELEPHONE-MOUTHPIECE. William M. English and Harry M. Lichtenstein, San Francisco, Cal. Filed October 7, 1909. A deep circumferential internal groove is provided to receive absorbent material.

956,960. APPARATUS FOR TRANSMITTING AND RECEIVING INFORMATION. John L. Hall, Schenectady, N. Y., assignor to General Electric Company. Filed October 5, 1907. A transmitter comprises two or more movable members bearing indicia, electromagnetic means for moving these elements, a plurality of switches controlling these means, and a plurality of rotatable cams for actuating the switches in a predetermined order.




956,893.—ALTERNATING-CURRENT MOTOR.

956,970. CASING FOR ELECTRIC-LAMP SOCKETS. Arthur L. Jacobs, Boston, Mass., assignor to Jennie M. Jacobs, Boston, Mass. Filed November 15, 1909. A socket casing comprises a shell, and a cap in two parts having interengaging means constructed to be moved into and out of interengagement with each other, whereby the parts may be locked against relative rotation.

957,001. WIRELESS TELEGRAPHY. Frederick G. Sargent, Graniteville, Mass. Filed November 9, 1905. Receiving apparatus of a wireless-telegraph system is provided with a circuit-breaker for the local circuit, connected with the relay-circuit and operating to break the direct connection between relay and coherer to compel all the Hertz waves to pass through coherer, and establish an indirect connection therebetween.

957,050. TELAUTOGRAPH INSTRUMENT. Elphonsus L. Golden, Oakland, Cal. Filed December 15, 1908. Includes a plurality of magnets having movable cores, a universal joint connected with all of the cores, a lever pivoted in the joint, and a writing instrument pivotally secured to the lever.

957,058. ELECTRIC FURNACE. Hiram W. Hixon, Philadelphia, Pa. Filed November 30, 1909. An electric zinc-smelting furnace.

957,067. ATTACHMENT FOR TELEPHONES. Joseph Kuhn, Pittsburg, Pa. Filed September 15, 1909. Comprises a plate provided with an angularly disposed portion at its top constituting a stop, a rotatable shaft carried by the support, a sign plate fixed to the support and normally held in an elevated vertical position against the stop, and a releasable means connected to the shaft and adapted normally to maintain the sign plate in an elevated vertical position and when released to allow the sign plate automatically to swing to a lowered vertical position.

957,077. AUTOMATIC CONTROL DEVICE FOR ELEVATORS. Louis J. Milke, Baltimore, Md. Filed January 29, 1909. A safety mechanism for electrically propelled elevators.

957,102. MEANS FOR COOLING DYNAMO-ELECTRIC MACHINES. Hermañ Roos, Berlin, Germany, assignor to General Electric Company. Filed October 18, 1907. There are a rotary member, a stationary laminated core body having radial inlet and outlet ventilating spaces and axial channels connecting the spaces, and separating blocks to close the inlet and outlet spaces against the rotary member.

957,103. MEANS FOR COOLING DYNAMO-ELECTRIC MACHINES. Hermañ Roos, Berlin, Germany, assignor to General Electric Company. Original application filed October 18, 1907. Divided and this application filed November 23, 1909. Similar to the preceding.

957,109. INTERNAL-COMBUSTION-ENGINE TIMER. Joseph A. Schneider, Lakeport, Cal., assignor of two-thirds to Andrew A. Brown, San Francisco, Cal. Filed June 29, 1909. A commutator or timer comprises an intermittently revoluble and eccentric traveling member, and a wiper projecting beyond the circumference thereof and carried thereby and corresponding widely separated fixed points co-acting therewith.

957,148. REFLECTOR AND ATTACHMENT THEREFOR. Henry D'Olier, Jr., Rutherford, N. J. Filed April 15, 1909. A sheet-metal reflector for electric incandescent lamps comprises a hemispherical portion with a cylindrical extension integral therewith, the cylindrical extension having a length substantially equal to one-half the radius of the hemispherical portion.

## PATENTS THAT HAVE EXPIRED.

The following is a list of the electrical patents (issued by the United States Patent Office) that expired May 9, 1910:

496,859. TRANSFER SYSTEM FOR TELEPHONE-SWITCHBOARDS. Emery A. Clark, Sioux City, Ia.

496,863. APPARATUS FOR ELECTROLYSIS OF SALT. Thomas Craney, Bay City, Mich.

496,865 and 496,864. ELECTROLYSIS APPARATUS. Thomas Craney Bay City, Mich.

496,871. ELECTRIC METER. Oscar Ericsson, Sioux Falls, S. D.

496,878. GALVANIC BATTERY. Charles W. Holtzer, Brookline, Mass.

496,882. ELECTRIC-ARC LAMP. Martin Kruegar, Chicago, Ill.

496,896. CONTACT FOR UNDERGROUND ELECTRIC RAILWAYS. William Q. Prewitt, Lexington, Ky.

496,901. SWITCHBOARD FOR ELECTRIC CIRCUITS. Albert L. Rohrer, Lynn, Mass.

496,904. MULTIPLE-SWITCHBOARD APPARATUS. Charles E. Scribner, Chicago, Ill.

496,905. MULTIPLE-SWITCHBOARD SYSTEM. Charles E. Scribner, Chicago, Ill.

496,906. MULTIPLE-SWITCHBOARD TESTING APPARATUS. Charles E. Scribner, Chicago, Ill.

496,907. TESTING APPARATUS FOR MULTIPLE-SWITCHBOARD SYSTEMS. Charles E. Scribner, Chicago, Ill.

496,918. SAFETY CONNECTION FOR INDUCTION COIL SYSTEMS. Elihu Thomson, Lynn, Mass.

496,945. ELECTRIC TRAVELING CRANE. William H. Morgan, Alliance, Ohio.

496,959. APPARATUS FOR UTILIZING SOLAR HEAT. Melvin L. Severy, Boston, Mass.

497,001. METHOD OF MAKING CONDUCTORS FOR ARMATURES. E. B. Crookes, Crompton, Chelmsford, England.

497,024. ELECTRIC RAILWAY. Rudolph M. Hunter, Philadelphia, Pa.

497,025. OVERHEAD ELECTRIC RAILWAY. Rudolph M. Hunter, Philadelphia, Pa.

497,038. ELECTRIC LAMP. John Waring, Manchester, Conn.

497,061. ELECTRIC-RAILWAY SWITCH. Edward F. Stone, Hyde Park, Mass.

497,062. SHOPLIFTING-DETECTOR. Fred Sturtevant, Charlestown, Mass.

497,110. MULTIPHASE ELECTRIC MOTOR. Paul A. N. Winand and Carl O. C. Billberg, Philadelphia, Pa.

497,128. ELECTRICAL CIRCUIT. Charles E. Chinnock, Brooklyn, N. Y.

497,128. COMMUTATOR FOR ELECTRIC GENERATORS OR MOTORS. Midbury W. Hassan, Rochester, N. Y.

497,129. ELECTROPLATING APPARATUS. Albert R. Reams, Elmira, Cal.

497,144. PEDAL-SWITCH FOR ELECTRIC MOTORS. Levi Teal, Philadelphia, Pa.

497,197. PORTABLE ELECTRIC ABRADING DEVICE. Aaron J. Nellis, Pittsburg, Pa.

497,200. ELECTRIC LAMP SUPPORT. James Nortney and Frank Schefold, New Albany, Ind.

497,203. ELECTRIC TIME STOCK-FEEDER. Herbert S. Page, Medford, and Livy Spear, Boston, Mass.

497,251. COUPLING FOR ELECTRIC-LIGHT AND GAS FIXTURES. George Peeples, Philadelphia, Pa.

497,263. ELECTRIC CIGAR-LIGHTER. William P. Carstarphen, Jr., Denver, Colo.

497,281. SIGNAL-TRANSMITTING APPARATUS. Morris Martin, Malden, Mass.